NAVSHIPS 0967-191-7010

WITH 0967-191-7012
0967-191-7013

P91-0
T-827

TECHNICAL MANUAL

FOR

RADIO TRANSMITTING SET

AN/URT-23(V)

REVISED BASIC WITH CHANGE 1 and TC-2

BUREAU OF SHIPS

NAVY DEPARTMENT

Temporary Correction T-2 to Technical Manual for Radio Transmitting Set AN/URT-23(V) NAVSHIPS 0967-191-7010

The ordering number for this temporary correction is 0967-191-7013.

This temporary correction revises the manual to reflect the equipment change made by Field Change 1-AN/URT-23(V). The purpose of this change is to provide equipment STANDBY and EMITTING functions to the AN/SSQ-54 Emitter Status Indicator Set. This field change applies to all Radio Transmitting Sets AN/URT-23(V) installed aboard ships with AN/SSQ-54 Emission Status Indicator Set.

When this change is included in the manual, the manual shall cover the equipment as though Field Change 1-AN/URT-23(V) has been accomplished. This change does not supersede any other correction or change.

Maintenance support activities shall make this change to the technical manual immediately, but shall keep superseded data intact for support of equipments which have not been modified.

Holders of equipment accompanied by technical manuals shall not make the change to the technical manual until the field change has been accomplished.

Make the following pen-and-ink changes:

Item	Fig/Table	Page	Action
1	Table 2-2	2-12	Add the following to the appropriate columns: "W13," "AM-3924(P)/URT J11," "MS3106A14S-7P," "3 Conductor (TSGA Type)," "_____," "AN/SSQ-54," and "_____."
2	Fig. 2-4	2-19/ 2/20	To right of W1 add: J11 TSGA Type Cable W13 to AN/SSQ-54

3	Fig. 4-26	4-69/4-70	Add following connections to 1A2J1:
4	Fig. 5-17	5-54	Below photograph add: "J11, K3, and K4 added to case (Field Change 1)"
5	Fig. 5-26	5-69/ 5-70	Change the figure as shown:

6	Table 6-2	6-28	Add the following to Parts List: "1A2CR3," "Same as 1A1CR1," and "5-17."
7	Table 6-2	6-29	Add the following in appropriate columns: "1A2K3," "Relay, 115 VAC, DPDT, Mfr. 02289, PN 2BR-1C-215," "5-17." "1A2K4," "Relay, 26.5 VDC, DPDT, Mfr. 71482, PN RP7633G4," "5-17."
8	Table 6-3	6-35/ 6-36	Add the following to Manufacturer's List: "02289," "HI-G Inc., Chicago, Ill." "71482," "C.P. Clare & Co.," "Windsor Locks, Conn."

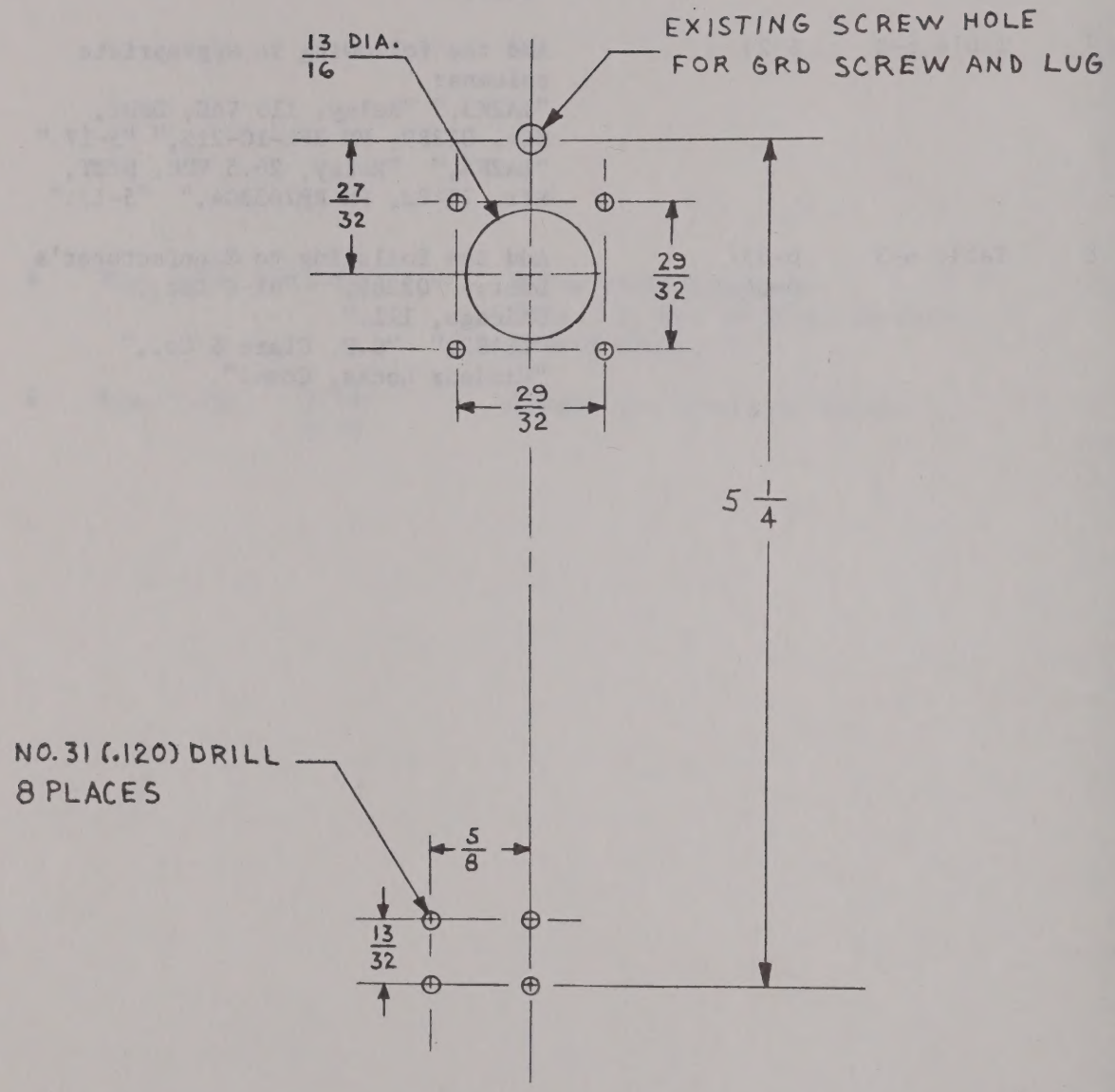


FIG. 1. HOLE LOCATIONS FOR AM-3924(P)/URT CASE, REAR OUTSIDE VIEW

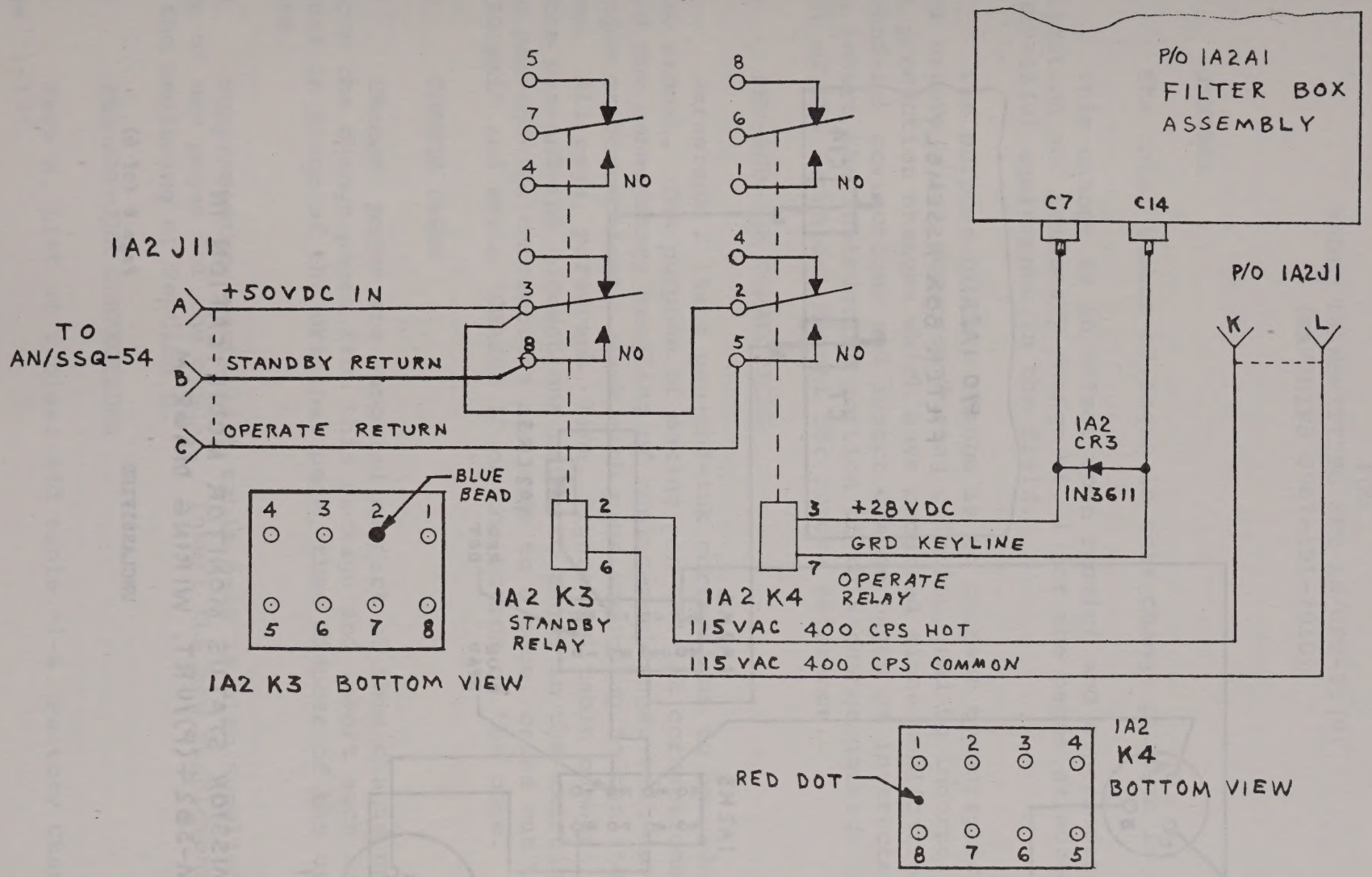


FIG. 2. EMISSION STATUS MONITOR MODIFICATION IN AM-3924(P)/URT, SCHEMATIC DIAGRAM

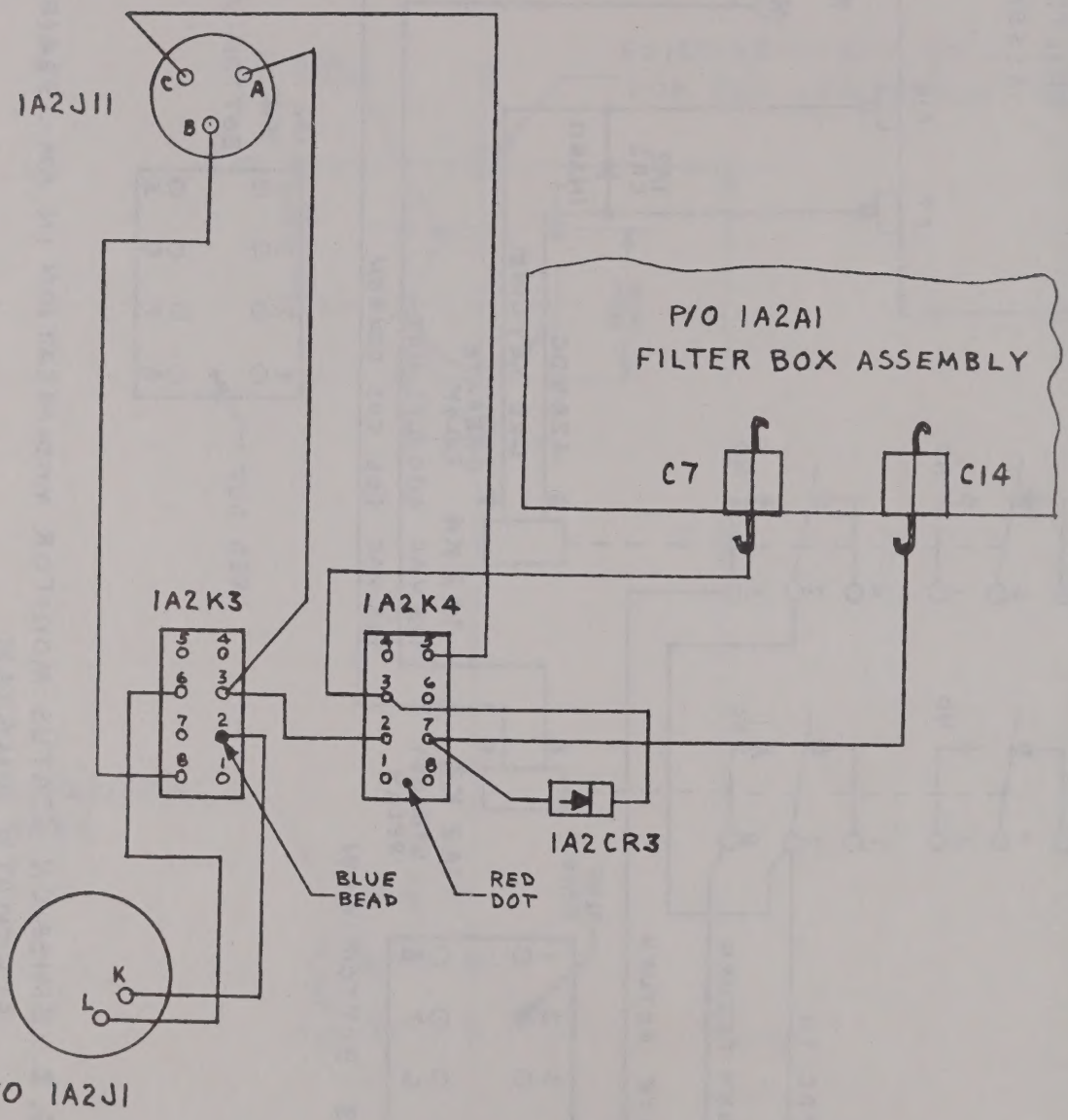


FIG. 3. EMISSION STATUS MONITOR MODIFICATION IN AM-3924(P)/URT, WIRING DIAGRAM

NAVSHIPS 0967-191-7012
PERMANENT CHANGE NO. 1

TO
TECHNICAL MANUAL
FOR
RADIO TRANSMITTING SET AN/URT-23(V)
(NAVSHIPS 0967-191-7010)

1.0 GENERAL

1.1 The total number of pages in this change package is 49.

1.2 This change is in effect upon receipt and supersedes the basic publication and temporary change no. 1 for the pages affected for all AN/URT-23(V) equipments in the field.

1.3 The purpose of this change is to correct typographical and other errors which occurred during printing, and to incorporate equipment production changes which have occurred since publication. Make pen-and-ink corrections and insert change pages as instructed below, then insert the instruction portion of this change package in the front of the Technical Manual for future reference.

1.4 PEN-AND-INK CORRECTIONS

1.5 Paragraph 2 lists pen-and-ink corrections to be made in the basic manual. The purpose of making pen-and-ink corrections is to avoid the unnecessary handling of replacement pages that have minor changes or corrections. Mark each page according to the instructions given. All page, paragraph, line, figure and table numbers specified in the pen-and-ink corrections refer to those in the existing manual. When pen-and-ink corrections are made to a page, cross out the word "ORIGINAL" and write "CHANGE 1" on the bottom of the page.

1.6 CHANGE PAGES

1.7 Change pages are supplied as part of this change package. Remove the change pages from this package and insert each in the manual in place of the original page, then dispose of the original pages.

1.8 Supplementary parts list table 6-2A is also supplied in the form of new pages for the manual. Insert the new supplementary table at the beginning of Section 6.

2.0 PEN-AND-INK CORRECTIONS

2.1 Page x, List of Tables: Add table "1-4. Factory Changes" page "1-17".

2.2 Page 1-1, last line, after NAVSHIPS 0967-032-0010: Add "or NAVSHIPS 0967-200-3010,".

2.3 Page 1-2, paragraph 1-11: Delete sentences 4 and 5, starting with "The chassis can also be----".

2.4 Page 1-5, in table of step k: Add DIODE "JAN1N975B" QTY "1", change QTY for JAN1N277M from "23" to "24", change QTY for JAN1N914 from "16" to "17", and change total QTY of diodes from "78" to "81".

2.5 Page 1-6, paragraph 1-29: Delete "No factory changes" and in its place add "Table 1-4 provides a list of factory changes that"--.

2.6 Page 1-10, Table 1-1: In QTY PER CONFIGURATION Column, add ⑦ for all four configurations; in NAME Column, add "Jumper 1A1P1"; in DESIGNATION Column, add "391-4000 ⑥" .

2.7 Page 1-16, paragraph 1-31, last line, after NAVSHIPS 0967-032-0010: Add "or NAVSHIPS 0967-200-3010,".

2.8 Page 2-3/2-4, figure 2-1:

2.8.1 In note 3, change "120 CFM" to "140 CFM" in two places.

2.8.2 In note 8, add at beginning ahead of Amplifier "when the PP-3916/UR is not in the stack,".

2.8.3 In Rear View, change vertical dimension "30.024 ± .080 REF" to "31.024 ± .090 REF".

2.8.4 In Rear View, delete "SEE NOTE 2" from callout PP-3916/UR optional unit.

2.8.5 In Side View, change SEE NOTE "9" to SEE NOTE "8".

2.9 Page 2-9, table 2-1, for equipment PP-3916/UR: Change "2A1P1" to "2A2P2" and change "2A1P2" to "2A2P1".

2.10 Page 2-9, paragraph 2-20f: Change "2A1TB1" to "2A2TB1".

2.11 Page 2-10, paragraph 2-21, fourth line: Change "120 CFM" to "140 CFM".

2.12 Page 2-13, table 2-3:

2.12.1 For 7th wire from top (labeled SHLD GRD R,S,U, in remarks column) change To Connector pin from "I" to "i".

2.12.2 For 8th wire from bottom (labeled TTY(-) in remarks column) change To Connector pin from "j" to "t".

2.13 Page 2-14, table 2-4, in REMARKS column: Delete plus sign "(+)" from in front of the two entries 24V SWITCHED and 24V HOT.

2.14 Page 2-19/2-20, figure 2-4, Note 4, second sentence: Change "Cable W3" to "Cable W5".

2.15 Page 2-22, paragraph 2-34d, after R11: Add ", PWR control R13,".

2.16 Page 2-21, paragraph 2-32, step a: Change dash number on connector listed in sub-step (4) from "-6P" to "-5P".

2.17 Page 2-27, paragraph 2-35: Delete step a.

2.18 Page 2-27, paragraph 2-35: Change step m to read ----by performing steps "ar through bt of paragraph 2-34".

2.19 Page 2-30, figure 2-7, add the following reference designations: "K1" to the undesignated relay coil above relay coil K2 and "S2" to the EXCITER NO. 1 - EXCITER NO. 2 switch.

2.20 Page 3-1, paragraph 3-7, last sentence: Change --indicator is "tuned" on to --indicator is "turned" on.

2.21 Page 3-15, step 3-31e: Change "320±30 VDC" to "290±50 VDC".

2.22 Page 3-15, step 3-31f: Change "500±50 VDC" to "500±75 VDC".

2.23 Page 3-15, Caution at bottom of page: Change "(above 330 MA)" to "(above 330 MA with no RF signal)".

2.24 Page 3-16, paragraph 3-33, second line: Change "NA/URA-38" to "AN/URA-38".

2.25 Page 3-18, step 3-36e: Change "RIGHT" to "LEFT".

2.26 Page 3-18, steps 3-36f and 3-36i: Change "LEFT" to "RIGHT".

2.27 Page 3-21, paragraph 3-48, last sentence, after NAVSHIPS 0967-032-0020: Add "or NAVSHIPS 0967-200-3020".

2.28 Page 3-23/3-24, table 3-5, Symptom "No driver or PA plate current (system will not key)": Change in PROBABLE FAULT 1. "1A2J8" to "1A2A1J8".

2.29 Page 4-4, paragraph 4-22, third line from bottom after NAVSHIPS 0967-032-0010: Add "or NAVSHIPS 0967-200-3010".

2.30 Page 4-9, figure 4-3, in the lower left corner: Change screen supply ("300" VDC) to screen supply ("287" VDC).

2.31 Page 4-12, figure 4-4:

2.31.1 In center of illustration change screen supply ("280" to 320 VDC) to screen supply ("287" to 320 VDC).

2.31.2 Add note 6 "Capacitor C49 not used in units with serial numbers greater than A170".

2.32 Page 4-17/4-18, paragraph 4-55, third from last line: Change --"drived"-- to --"derived"--.

2.33 Page 4-19/4-20, figure 4-7:

2.33.1 On left side of illustration add "diode 1A1A3CR6" with anode connected to the junction of 1A1A3CR5 and 1A1A3R5 at top of page and cathode connected to ungrounded terminal of TUNE KEY switch 1A1S3 at bottom of page.

2.33.2 On right side of illustration add "Zener diode CR27" in lead from Q19 to CLASS B DRIVE TO BIAS CIRCUIT output with anode toward output and cathode toward junction of Q19 collector and CR7.

2.33.3 In transistor stage Q19, delete R20 and show R18 connected directly to the base (not emitter). Connect emitter to 11 VDC through diode "CR29" (cathode towards emitter, anode towards 11 VDC). Add "Note 2" after Q19 SWITCH.

2.33.4 Add Note "2. R20 is deleted, R18 is changed, and CR29 is added on all units except serial numbers A5 through A71 (see figure 5-23)

2.33.5 On transistor Q11, reverse the direction of the emitter arrow.

2.33.6 Near top of illustration, place a dot on the crossover of the line from CR22 cathode to P1 pin r and the line from R44 to the junction of R16 and R17, to indicate that these two lines are connected.

2.34 Page 4-21, paragraph 4-60, tenth line from top of paragraph, after ----for class B operation: Add "Diode CR29 provides temperature compensation for switch Q19. Zener diode CR27 reduces the maximum voltage seen at the collector of switch Q16, limiting the collector dissipation."

2.35 Page 4-21, paragraph 4-60, third line from bottom of paragraph: Change ----"(forward biased) and PPC generated"---- to ----"(forward biased), the PPC voltage that is generated"----.

2.36 Page 4-23, paragraph 4-68, fifth line from top: Change ----PPC amplifier "1A1AQ6"---- to ----PPC amplifier "1A1A6Q3"----.

2.37 Page 4-24, figure 4-8:

2.37.1 On RESET switch in center of diagram, change pin "2" to "3" and pin "3" to pin "2".

2.37.2 On bottom of illustration, the output from Q8 emitter, change 1A1J4 pin callout from "C" to "c".

2.37.3 On left side, add "section 4 rear" to 1A1S7.

2.38 Page 4-27/4-28, figure 4-9:

2.38.1 On output from bridge rectifier in upper left corner, change connector 1A1J5 pin callout from "k" to "h".

2.38.2 Add "diode CR28" with anode connected to base and cathode to emitter of transistor Q20.

2.38.3 On left side of illustration, for KEY INTERLOCK input, change pin callout from "P" to "E".

2.38.4 In center of illustration, add callout "11 VDC" to resistor R11 termination.

2.38.5 Add "Capacitor C7" across zener diode CR3.

2.38.6 Add note 2 "Capacitor C7 not used in units with serial numbers A1 through A206".

2.39 Page 4-29, second line from top of page, at end of sentence: Add "Diode CR28 protects switch Q20 against excessive reverse base-emitter voltage."

2.40 Page 4-29, paragraph 4-75, last line, after (NAVSHIPS 0967-032-0010: Add "or NAVSHIPS 0967-200-3010).".

2.41 Page 4-30, paragraph 4-80, third line, at the end of the second sentence for the paragraph: Add "Capacitor C3 is an RF bypass."

2.42 Page 4-31, figure 4-10:

2.42.1 Change reference designator for OVERLOAD indicator from "DS4" to "DS5".

2.42.2 Redraw ALARM switch S6, to show switch wiper hinged at contact 5 (instead of 4) and making contact with contact 6.

2.42.3 At point where wire from XC30-6 to S6 pin 4 crosses wire from J4 pin M to OVERLOAD indicator, add a "dot", to indicate a junction at this point.

2.43 Page 4-32, paragraph 4-80, fifth line from top of page: Change "or" to "on".

2.44 Page 4-33/4-34, figure 4-11:

2.44.1 In both view A and view B, show the ground connection to pin 20 of switch section S7A front extended to make contact for all positions of the switch.

2.44.2 In view B, add an "arrow head" to A4S1C front contact 7.

2.45 Page 4-39/4-40, figure 4-13:

2.45.1 The junctions of the wires from pins 32 and 33 of 1A1J3 to transformer 1A1T1 with the wires from PRIMARY POWER switch 1A1S4 to 1A1TB1-11 and 12 are reversed. At the point where these four wires cross, delete the existing dots representing junction points, and draw in new dots showing the wire from 1A1J3-33 to transformer 1A1T1 connected to the wire from 1A1S4-1 to 1A1TB1-12; and showing the wire from 1A1J3-32 to 1A1T1 connected to the wire from 1A1S4-2 to 1A1TB1-11.

2.45.2 At connector 1A1J3 pins 33 and 32, change mating plug callout from "1A1P2" to "1A1P3".

2.45.3 On right edge of illustration, change output for pins M and L from --"T-827/URT" to --"AN/URT-38", and change output for pins S and R from --"AN/URA-38" to --"T-827/URT".

2.45.4 On legend in lower left corner of illustration, change the double dotted line to read connections used when operating with Power Supply "PP-3917/UR".

2.46 Page 4-41, paragraph 4-96, third line from bottom: Change "1A2A1J6" to "1A2A1J7" and "1A2A1J7" to "1A2A1J6".

2.47 Page 4-41, paragraph 4-97, fourth line from bottom: Change "1A2A1J6" to "1A2A1J7" and "1A2A1J7" to "1A2A1J6".

2.48 Page 4-43/4-44, figure 4-14:

2.48.1 In upper left corner of illustration, change plug connected to 1A1TB2-2 from "1A1A8P1" to "1A1A8P2".

2.48.2 Change reference designator for STANDBY indicator from "1A1D52" to "1A1DS2".

2.48.3 Change reference designator for time elapsed meter from "1A1B2" to "1A1B3".

2.48.4 On P/O 1A1TB2 in center of illustration, add callout "P/O 1A1P5" for jumper between pins 10 and 7; and correct callouts for double dotted jumpers connecting to pins 7 and 8 to read "P/O 1A1A8P2".

2.48.5 Upper left corner of illustration, at junction of 1A1TB2 pin 11 and P/O 1A1P5, there should be an arrowhead on both ends of P/O 1A1P5.

2.49 Page 4-47/4-48, figure 4-15:

2.49.1 Change callout for capacitor in upper left corner from "1A1B1" to "1A1C1".

2.49.2 Change callout for OPERATE indicator from "1A1D53" to "1A1DS3".

2.49.3 On left side of illustration, for 20 VDC OPERATE input, change callout for connector mating with 1A1J3 from "1AZP3" to "1A2P3".

2.49.4 On lower center of illustration in the terminal board labeled P/O 2A2TB1, change pin "21" to "19" and pin "19" to "21".

2.49.5 Add reference designator "1A1DS2" to STANDBY indicator.

2.49.6 Add note "Capacitor C49 not used in units with serial numbers greater than A170".

2.50 Page 4-51, figure 4-17: Delete wire from Q12 collector to P1-h, and draw in a connection from Q12 collector to junction of R26 and R27; Change "R26" to "R26,R36".

2.51 Page 4-51, paragraph 4-118, third line from top: Change ----"R27,CR30"---- to ----"R27,R36,CR30"----.

2.52 Page 4-52, paragraph 4-122, fifth line from top: Change --"diode CR1 to the center" to --"diode CR1 and capacitor C1, putting about +37 volts on the center"---.

2.53 Page 4-53, paragraph 4-125, line 2: Change --"6 and 7"-- to --"6 and 8"--.

2.54 Page 4-53, paragraph 4-125, line 4: Change --"6 and 8"-- to --"6 and 7"--.

2.55 Page 4-54, figure 4-19: Show the junction of R3 and R4 as connected to the ground line at the point of intersection and change two output designations from "2A2TB2-" to "2A1TB1-".

2.56 Page 4-55, paragraph 4-134, at end of paragraph add following sentence: "Resistors A1R1 and A1R2 serve as a bleeder resistor."

2.57 Page 4-55, paragraph 4-135, last line: Change "amplifying" to "minimizing" then add following sentence at end of paragraph. "Resistors A1R3 through A1R7 serve as a bleeder resistor."

2.58 Page 4-56, figure 4-20:

2.58.1 Where transformer secondaries connect to terminal board, change terminal board callouts in three places from "P/O 2A2TB2" to "P/O 2A1TB1".

2.58.2 On diode stacks CR1, CR2, and CR3, change pin "1" to "3" and "3" to "1".

2.58.3 On 500 VDC output, change fuse callout from "F1" to "F2".

2.58.4 Change 2A1TB1 terminals "4,2,3" to "1,2,3".

2.59 Page 4-60, table 4-2: Add second probable fault to symptom Can't key system from T-827/URT: "FREQUENCY MC switch 1A1S7 not at AUTO".

2.60 Page 4-61/4-62, figure 4-22:

2.60.1 In note 5, change "AN/ISM-116" to "AN/USM-116".

2.60.2 In upper left corner of illustration, shorten the line called out as "5 wire code" so that it extends from encoding switch S7-1 to decoding switch A4S1C. (Circuit from A4S1C to Gate A5CR1 is not part of 5 wire code.)

2.60.3 Label block on extreme right of illustration "ANTENNA CHANGE-OVER RELAY".

2.60.4 In VSWR BRIDGE block A3, add to APC-PPC OUTPUT callout for E2, "J5-p".

2.61 Page 4-63/4-64, figure 4-23:

2.61.1 On input line to base of switch Q17 change connector pin callout from "P/O 1A1J5-5" to "P/O 1A1J5-S".

2.61.2 On line from key switch just below switch Q17, change callout "A3-7" to "A3E7".

2.62 Page 4-65/4-66, figure 4-24:

2.62.1 Change note 11 to read "Equipment in operate: key up, and/or key interlock present, -0.1 VDC; key down, +4.5 VDC".

2.62.2 On extreme left side of illustration, change callout "TB1" to "T1".

2.62.3 In output from Bridge Rectifier CR14-17 labeled Stabilization Voltage to APC circuit change "4-25" to "4-23".

2.62.4 On ALARM DISABLE switch S6 eliminate the extra contact shown for contact 5, and show the line to DS1 connected to contact 5 of S6.

2.62.5 On extreme right edge of illustration, for the callout labeled -30 VDC to T-827/URT change connector pin callout for P/O 1A2A1J7 from "N" to "V".

2.62.6 On lower right corner of illustration on the line from 28V SWITCH Q8-Q9, change connector pin callout for P/O J4 from "C" to "c".

2.62.7 On left side of illustration, in the line under 115 VAC to TB2-9, 10, change "SEE FIG. 4/25,4-26)" to "(SEE FIG. 4-25)".

2.62.8 In callout from base of PPC amplifier Q3, change "SEE R34-23)" to "(SEE FIG. 4-23)".

2.63 Page 4-67/4-68, figure 4-25:

2.63.1 Top of diagram, left center lines for 24 VAC HOT and 24 VAC SWITCHED are reversed. Show "24 VAC HOT" line from A2J1-J connected to A2T2 pin 29 (instead of A1TB1-16), and show "24 VAC SWITCHED" from A2J1-H connected to A1TB1-16 (instead of A2T2 pin 29).

2.63.2 In center of illustration, for test point N, change pin number in TB1 from "1" to "9".

2.63.3 In lower right section of illustration, pin callouts for 115 VAC outputs are reversed. Starting just after fuse F5, change P/O J3 pin "42" to "43" and "43" to "42". On 115 VAC to T-827/URT callout, change pin "R" to "S" and "S" to "R". On 115 VAC to C-3698/URA-38 callout, change pin "M" to "L" and "L" to "M".

2.63.4 In lower right section of illustration, change time delay relay pin callouts "5,7,6,4,1" to "5", and label opposite side of relay contacts "7,6,4,1".

2.63.5 On meter resistor board 1A1A7 input and output callouts are reversed. Change input callout "E2" to "E4" and output callout "E4" to "E2".

2.63.6 For test points R, change "Note 3" to "Notes 3,4" in two places.

2.64 Page 4-69/4-70, figure 4-26:

2.64.1 Callouts for meter resistor board input and output are reversed. Change callout "E2" to E4" and callout "E4" to "E2".

2.64.2 In lower right corner of illustration, pin callouts for 115 VAC outputs are reversed. Starting just after fuse F5, change P/O J3 pin "42" to "43" and "43" to "42". On 115 VAC to T-827/URT call-out, change pin "R" to "S" and "S" to "R". On 115 VAC to C-3698/URA-38 callout, change pin "M" to "L" and "L" to "M".

2.65 Page 5-1, paragraph 5-2, last sentence, after NAVSHIPS 0967-032-0010: Add "or NAVSHIPS 0967-200-3010,".

2.66 Page 5-2, paragraph 5-6g: Change voltage tolerance from "±50" to "±60".

2.67 Page 5-2, paragraph 5-6h: Change voltage tolerance from "±30" to "±60".

2.68 Page 5-2, paragraph 5-6l, second line: Change "300" to "320".

2.69 Page 5-3, paragraph 5-8f: Change voltage tolerance from "±30" to "±60".

2.70 Page 5-4, paragraph 5-9, title: Delete the word "REFLECTED".

2.71 Page 5-4, paragraph 5-10, second line, and paragraph 5-12, first line: Delete the word "reflected".

2.72 Page 5-10: Change paragraph 5-20, step l (l) to read "Set AM-3924(P)/URT FREQUENCY MC switch to higher of two bands to be aligned according to table 5-1 (i.e., 2.5 to 3.0 MC or 3.5 to 4.0 MC)."

2.73 Page 5-11: Change paragraph 5-20, step l (7) to read "Set AM-3924(P)/URT FREQUENCY MC switch to lower band (i.e., 2.0 to 2.5 MC or 3.0 to 3.5 MC)."

2.74 Page 5-11: Change paragraph 5-20, step m (l) to read "Set AM-3924(P)/URT FREQUENCY MC switch at band to be aligned."

2.75 Page 5-12, paragraph 5-23, last line, after NAVSHIPS 0967-032-0010: Add "or NAVSHIPS 0967-200-3010".

2.76 Page 5-12, last line: Change "pockets" to "sockets".

2.77 Page 5-22, step 5-38s: Delete "Drill a 0.063 hole in motor shaft and" portion of step (hole is already drilled in shaft).

2.78 Page 5-29, paragraph 5-42t: After first sentence add "(Refer to figure 5-11 views to avoid placing pin 180° out of position.)".

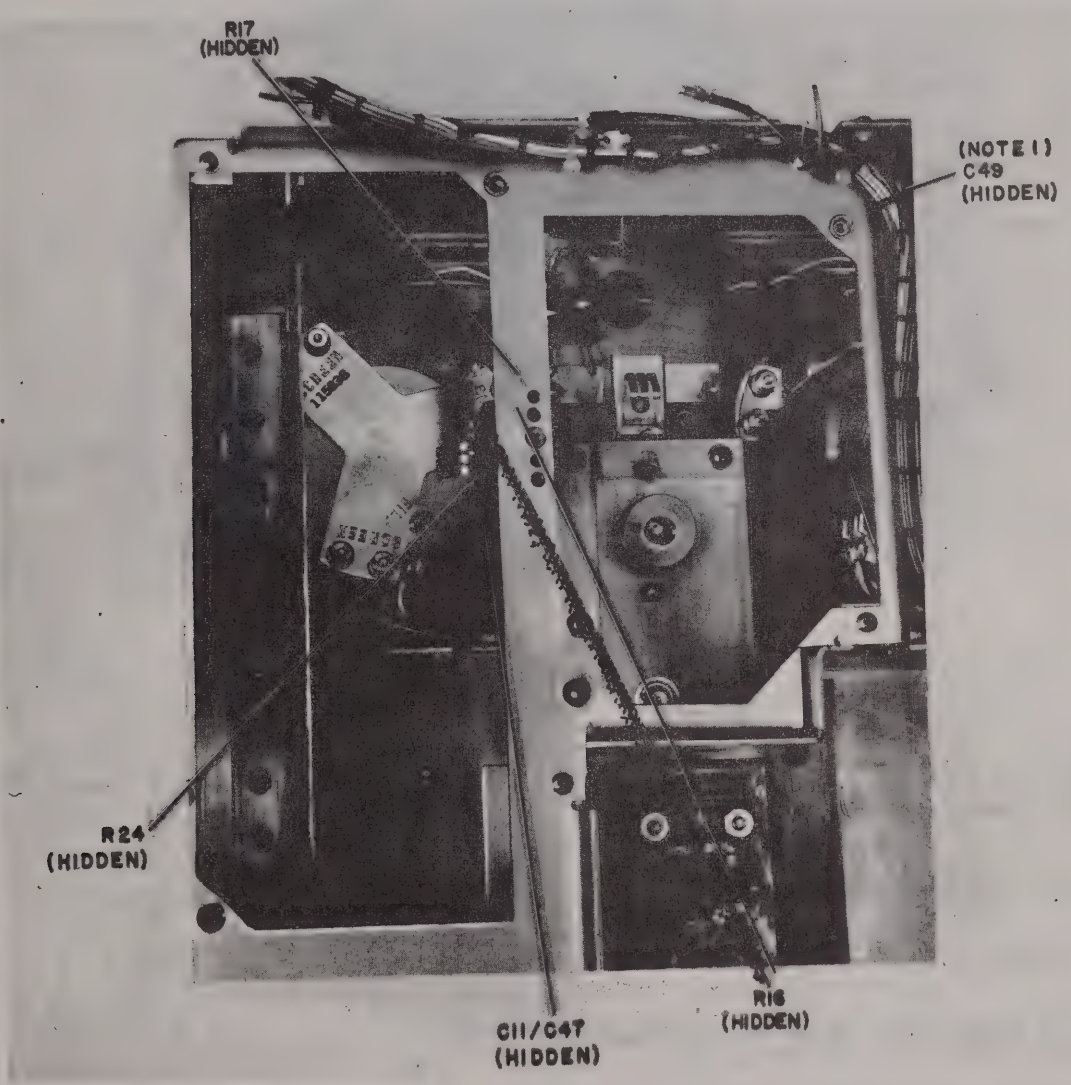
2.79 Page 5-29, paragraph 5-42v: Change drill size from "50" to "52".

2.80 Page 5-33, table 5-2:

2.80.1 For OPERATE voltage on terminal 8, change "-83" to "-98".

2.80.2 For KEYED, NO SIGNAL voltage on terminal 8, change "-2.7" to "-7.6".

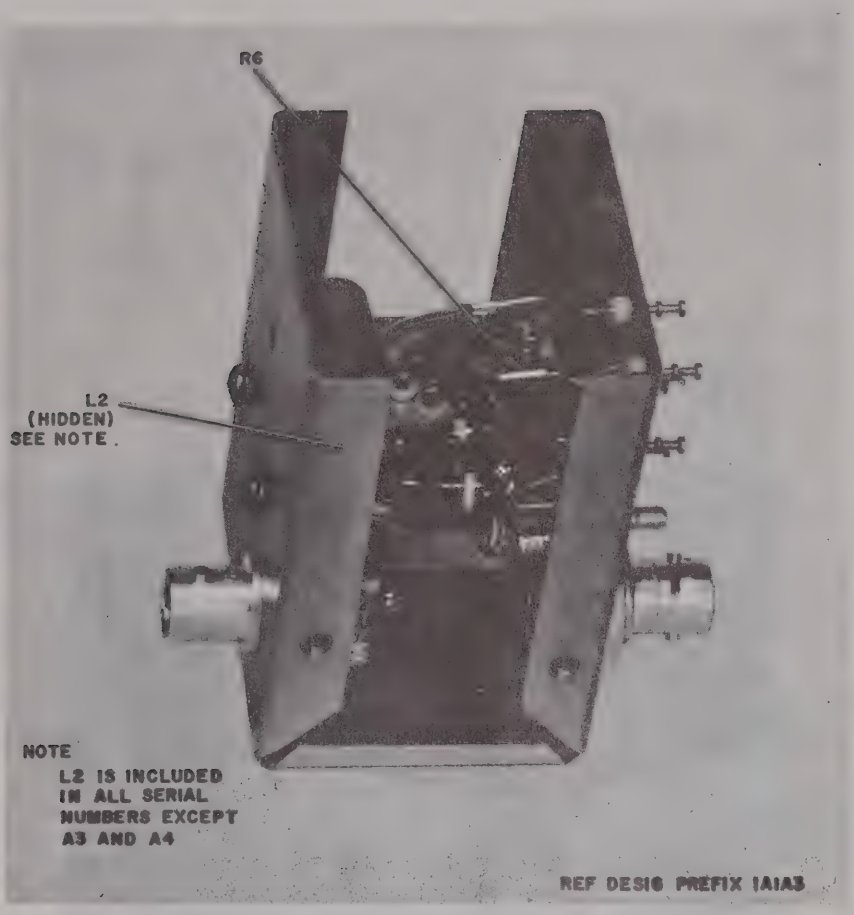
2.81 Page 5-42, figure 5-9: Add callouts as shown on following illustration.



Add:

"NOTE 1: Not used in units with serial numbers greater than A170."

2.82 Page 5-49, figure 5-12: Add callouts as shown on following illustration.



2.83 Page 5-59/5-60, figure 5-22, on bottom of illustration: Change transformer callout from "1A1A8TA" to "1A1A8T2".

2.84 Page 5-65/5-66, figure 5-24: Change capacitor values and add new capacitor C69 as follows:

2.84.1 Change C28 from "1000" to "820 NOTE 6".

2.84.2 CHANGE C29 from "360" to "330".

2.84.3 Change C38 from "100" to "75 NOTE 7".

2.84.4 Change C39 and C40 from "100" to "150 NOTE 7".

2.84.5 Change C44 from "150" to "180".

2.84.6 Change C48 from "110" to "150".

2.85.7 Change C50 and C51 from "100" to "110".

2.84.8 Change C52 from "100" to "150".

2.84.9 Change C57 from "300" to "220".

2.84.10 Change C68 from "220" to "200".

2.84.11 Delete C41.

2.84.12 Add C69, 220 PF, in parallel with C57.

2.84.13 Add Note "6. Value shown for C28 is for all units except serial numbers A3 through A145 in which it is 1000 PF."

2.84.14 Add Note "7. Values shown for C38 and C39 is for all units except serial numbers A5,A6,A8,A9,A10,A13 in which they are 100 PF."

2.85 Page 5-69/5-70, figure 5-26: Change "T1" in callouts for pins 32 and 33 of connector P3 and pins D and E of J1 to "T2".

2.86 Page 5-71/5-72, figure 5-27, in enclosed area labeled A1: Change the value of resistors R1 and R3 from "10" to "56".

2.87 Page 5-73/5-74, figure 5-28: Change "T1" in callouts for pins D and E of connector 2A2J1 to "T2".

2.88 Page 6-3, table 6-1: For unit no. 1 change page number called out from "6-4" to "6-3".

2.89 Page 6-9, table 6-2: For 1A1P1, delete note 5.

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TECHNICAL MANUAL

for

RADIO TRANSMITTING SET AN/URT-23(V)

DEPARTMENT OF THE NAVY
NAVAL SHIP SYSTEMS COMMAND

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3-1	Change 1	4-57 to 4-59	Original	6-9	Change 1
3-2 to 3-14	Original	4-60 to 4-72	Change 1	6-10 to 6-36	Original
3-15 to 3-16	Change 1	5-1 to 5-4	Change 1		

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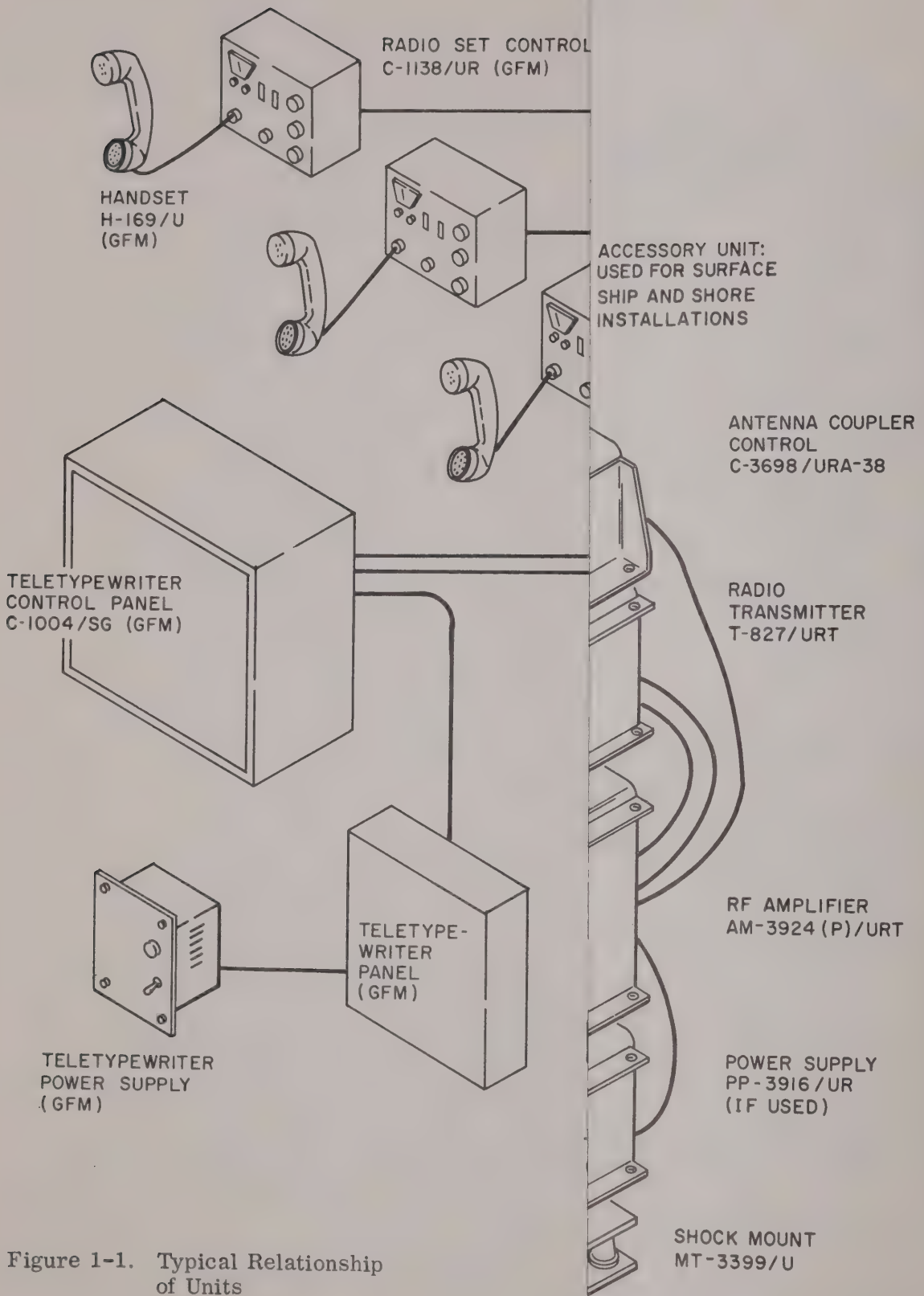


Figure 1-1. Typical Relationship of Units

SECTION 1

GENERAL INFORMATION

1-1. SCOPE.

1-2. This technical manual is in effect upon receipt and supersedes NAVSHIPS 96026. Extracts from this publication may be made to facilitate the preparation of other Department of Defense publications.

1-3. This technical manual describes and contains the necessary information for the installation, operation, troubleshooting, and maintenance of Radio Transmitting Set AN/URT-23(V). Additionally, this manual includes related tuning and operating information for accessory Antenna Coupler Group AN/URA-38. Hereinafter, Radio Transmitting Set AN/URT-23(V) will be referred to as the AN/URT-23(V).

1-4. DESCRIPTION.

1-5. GENERAL.

1-6. The AN/URT-23(V) is a 1 KW single-sideband Radio Transmitting Set that can be supplied in any one of four possible configurations. The normal configuration will include Radio Transmitter T-827/URT, and will be capable of general purpose voice, continuous wave, and radio teletypewriter transmissions in the 2.0 to 30.0 MC frequency range. The exact spacing and number of channels available for operation in this configuration is dependent on the model of the T-827/URT supplied as a part of the AN/URT-23(V) (paragraph 1-8). In the other configurations, the modes of operation, frequency range, and number of channels available will depend on the exciter being used. Stack or rack mounting may be used to install the units of the AN/URT-23(V) in a ship or shore fixed installation with other ancillary equipment to form a complete communications system such as that shown in figure 1-1. Any one of three three-phase primary power sources can be used to provide operating power to the AN/URT-23(V): 115 volts line-to-line, 400 CPS; or 208 or 440 volts line-to-line, 60 CPS. The major units used to make up the four AN/URT-23(V) configurations are: Radio Transmitter T-827/URT, Radio Frequency Amplifier AM-3924(P)/URT, Power Supply PP-3916/UR or (optionally) Power Supply PP-3917/UR, and Electrical Equipment Shock Mount Base MT-3399/U. Hereinafter, these units will be referred to as the T-827/URT, AM-3924(P)/URT, PP-3916/UR, PP-3917/UR, and MT-3399/U, respectively.

1-7. RADIO TRANSMITTER T-827/URT.

1-8. The T-827/URT is a low level transmitter (exciter) which provides a USB, LSB, ISB, CW, FSK, or Compatible AM RF signal of sufficient power (approximately 100 MW) to drive the AM-3924(P)/URT. Digital tuning is used to cover the 2.0 to 30.0 MC frequency range. (Model T-827/URT tunes from 2.0 to 29.9995 MC in 500 CPS increments; Model T-827A/URT and later models tune from 2.0 to 29.9999 MC in 100 CPS increments.) A five wire coded output from the T-827/URT is also applied to the AM-3924(P)/URT to automatically tune it to the correct frequency band. The T-827/URT is housed in a metal case which can be stack or rack mounted with the associated units. For a more complete description, refer to NAVSHIPS 0967-032-0010, Technical Manual for Radio Transmitter T-827/URT.

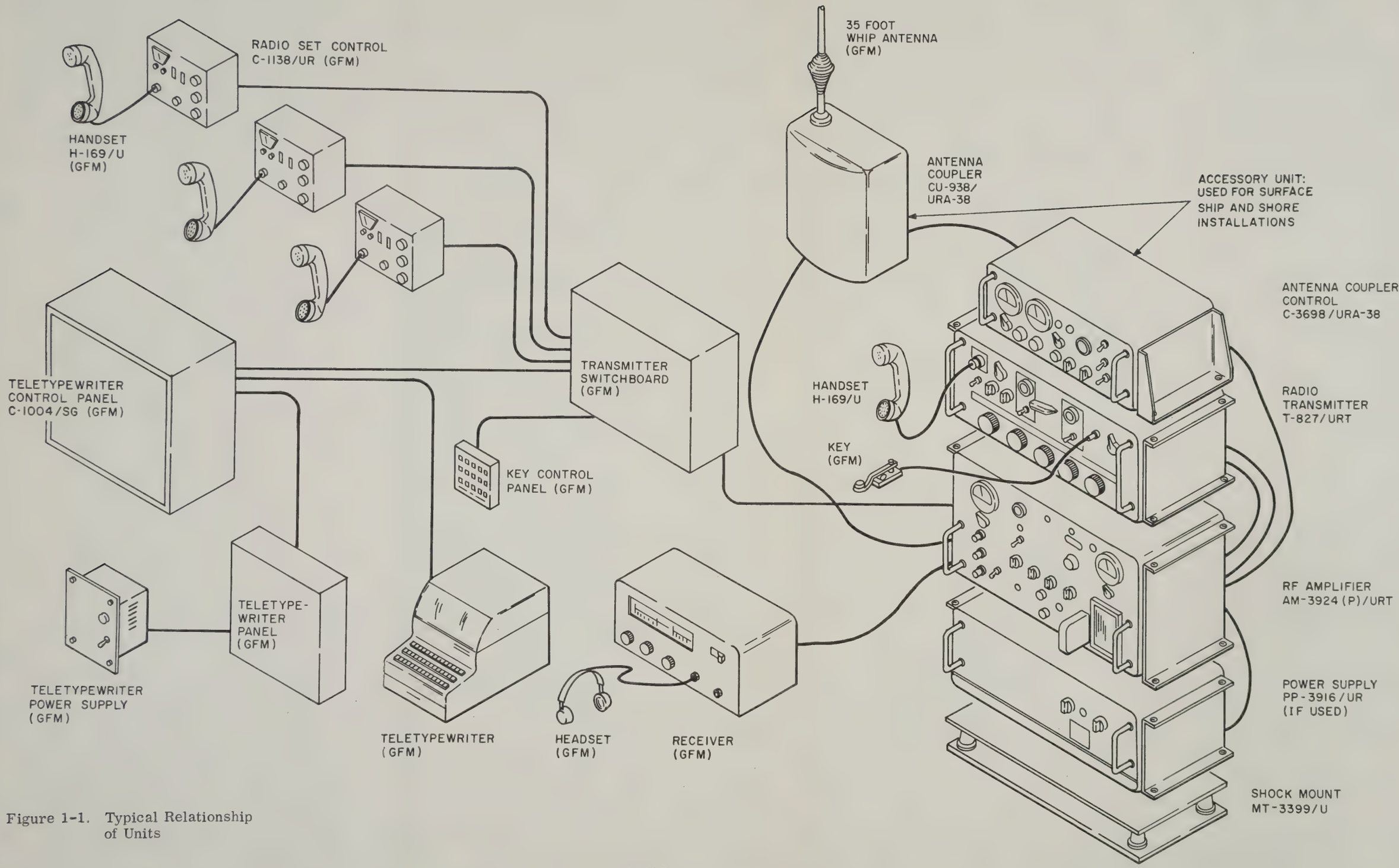


Figure 1-1. Typical Relationship of Units

SECTION 1

GENERAL INFORMATION

1-1. SCOPE.

1-2. This technical manual is in effect upon receipt and supersedes NAVSHIPS 96026. Extracts from this publication may be made to facilitate the preparation of other Department of Defense publications.

1-3. This technical manual describes and contains the necessary information for the installation, operation, troubleshooting, and maintenance of Radio Transmitting Set AN/URT-23(V). Additionally, this manual includes related tuning and operating information for accessory Antenna Coupler Group AN/URA-38. Hereinafter, Radio Transmitting Set AN/URT-23(V) will be referred to as the AN/URT-23(V).

1-4. DESCRIPTION.

1-5. GENERAL.

1-6. The AN/URT-23(V) is a 1 KW single-sideband Radio Transmitting Set that can be supplied in any one of four possible configurations. The normal configuration will include Radio Transmitter T-827/URT, and will be capable of general purpose voice, continuous wave, and radio teletypewriter transmissions in the 2.0 to 30.0 MC frequency range. The exact spacing and number of channels available for operation in this configuration is dependent on the model of the T-827/URT supplied as a part of the AN/URT-23(V) (paragraph 1-8). In the other configurations, the modes of operation, frequency range, and number of channels available will depend on the exciter being used. Stack or rack mounting may be used to install the units of the AN/URT-23(V) in a ship or shore fixed installation with other ancillary equipment to form a complete communications system such as that shown in figure 1-1. Any one of three three-phase primary power sources can be used to provide operating power to the AN/URT-23(V): 115 volts line-to-line, 400 CPS; or 208 or 440 volts line-to-line, 60 CPS. The major units used to make up the four AN/URT-23(V) configurations are: Radio Transmitter T-827/URT, Radio Frequency Amplifier AM-3924(P)/URT, Power Supply PP-3916/UR or (optionally) Power Supply PP-3917/UR, and Electrical Equipment Shock Mount Base MT-3399/U. Hereinafter, these units will be referred to as the T-827/URT, AM-3924(P)/URT, PP-3916/UR, PP-3917/UR, and MT-3399/U, respectively.

1-7. RADIO TRANSMITTER T-827/URT.

1-8. The T-827/URT is a low level transmitter (exciter) which provides a USB, LSB, ISB, CW, FSK, or Compatible AM RF signal of sufficient power (approximately 100 MW) to drive the AM-3924(P)/URT. Digital tuning is used to cover the 2.0 to 30.0 MC frequency range. (Model T-827/URT tunes from 2.0 to 29.9995 MC in 500 CPS increments; Model T-827A/URT and later models tune from 2.0 to 29.9999 MC in 100 CPS increments.) A five wire coded output from the T-827/URT is also applied to the AM-3924(P)/URT to automatically tune it to the correct frequency band. The T-827/URT is housed in a metal case which can be stack or rack mounted with the associated units. For a more complete description, refer to NAVSHIPS 0967-032-0010, Technical Manual for Radio Transmitter T-827/URT.

1-9. RADIO FREQUENCY AMPLIFIER AM-3924(P)/URT.

1-10. The AM-3924(P)/URT (figures 5-6 through 5-17) is a two stage 40 DB linear power amplifier which produces an output of 1 KW of PEP and average power with a nominal input of 100 MW. Nineteen frequency bands are used to cover the 2.0 to 30.0 MC operating frequency range. The operating band is automatically selected by a five-wire code generated by the T-827/URT or internally generated if the T-827/URT is not used. The code controls two motor-driven bandswitch assemblies on which are mounted broadband transformers used as interstage and output tuned circuits for the two amplifier stages. Automatic control circuits compensate for variations in system gain, mode of operation, or loading to protect the unit against overload. The AM-3924(P)/URT can be modified to allow operation with an exciter other than the T-827/URT (paragraph 2-40). Plugged mounting holes are provided in the front panel and rear of the case to allow the installation of the circuitry. The AM-3924(P)/URT operates from a three phase primary power source of 115 volts line-to-line, 400 CPS; or 208 or 440 volts line-to-line, 60 CPS. All low voltages required for operation (except two of the relay control voltages) are internally produced. The high voltages required for powering the electron tubes used in the amplifier stages are produced by the associated Power Supply PP-3916/UR (when using 60 CPS primary power) or the optional internally mounted Power Supply PP-3917/UR (when using 400 CPS primary power).

1-11. The AM-3924(P)/URT consists of eight major subassemblies (one of which is the PP-3917/UR, when used) which are secured to a chassis and panel assembly. The chassis and panel assembly is mounted on ball bearing slides and is housed in a metal case. The slides allow the chassis to be fully extended from the case and locked in a horizontal position or rotated 90 degrees up and locked in a vertical position to facilitate servicing. The chassis can also be tilted downward a few degrees to the limit of the case cable. However, this is not recommended since undue strain may be placed on the cable. All operating controls and indicators are located on the front panel. Those controls used only for initial set-up are protected by a hinged access cover. All connections are made at the rear of the case. The four electron tubes and the associated interstage broadband transformer assemblies are cooled by forced convection. Cooling air is drawn through a filter on the front panel and exhausted through a port on the rear of the case.

1-12. POWER SUPPLY PP-3916/UR.

1-13. The PP-3916/UR (figure 5-20) produces operating voltages for the AM-3924(P)/URT when operating from a 60 CPS, three phase, 208 or 440 volt line-to-line primary power source. All components of the PP-3916/UR, except the power transformers, are mounted on a chassis and panel assembly, which is hinge-mounted to a metal case. Loosening five front panel captive screws allows the chassis and panel assembly to be dropped 90 degrees to a horizontal position for servicing and troubleshooting. The power transformers are constructed as an integral part of the case. Two self-indicating fuse holders and a POWER ON indicator are located on the front panel of the PP-3916/UR; there are no operating controls. Connections to the PP-3916/UR are made at the rear of the case.

1-14. POWER SUPPLY PP-3917/UR.

1-15. The PP-3917/UR (figure 5-18) produces operating voltages for the AM-3924(P)/URT when operating from a 400 CPS, three phase, 115 volt line-to-line primary power source. When used, the PP-3917/UR is mounted as a subassembly of the AM-3924(P)/URT. All components of the PP-3917/UR are mounted on a base plate which is secured to the underside of the AM-3924(P)/URT chassis. The PP-3917/UR is interconnected to two terminal boards on the AM-3924(P)/URT chassis through a harness to which two fanning strips are attached.

1-16. ELECTRICAL EQUIPMENT SHOCK MOUNT BASE MT-3399/U.

1-17. The MT-3399/U (figure 1-2) is used in shipboard installation as a resilient shock mounting base on which the units of the AN/URT-23(V) are stack mounted. It consists of an open frame structure attached to a flat mounting plate through vibration isolators. These isolators protect the units by damping shock and/or vibration of continuous or intermittent origin. Brackets are attached to the sides of each unit to enable the units to be secured to each other and in turn to the MT-3399/U. The MT-3399/U is anchored to the deck of the ship or some other suitable horizontal mounting surface. In addition, a sway brace secures the top of the stack to the bulkhead of the ship. This limits lateral motion, and thus, reduces the required sway space. The sway brace also prevents the stack from tilting when an equipment chassis is withdrawn from its case. The MT-3399/U and mounting brackets are constructed of aluminum to reduce the equipment's magnetic signature, thus making the mounting system suitable for use in configurations where the use of magnetic material is critical (such as on minesweepers).

1-18. REFERENCE DATA.

1-19. The following paragraphs contain data on the electrical characteristics of the units of the AN/URT-23(V).

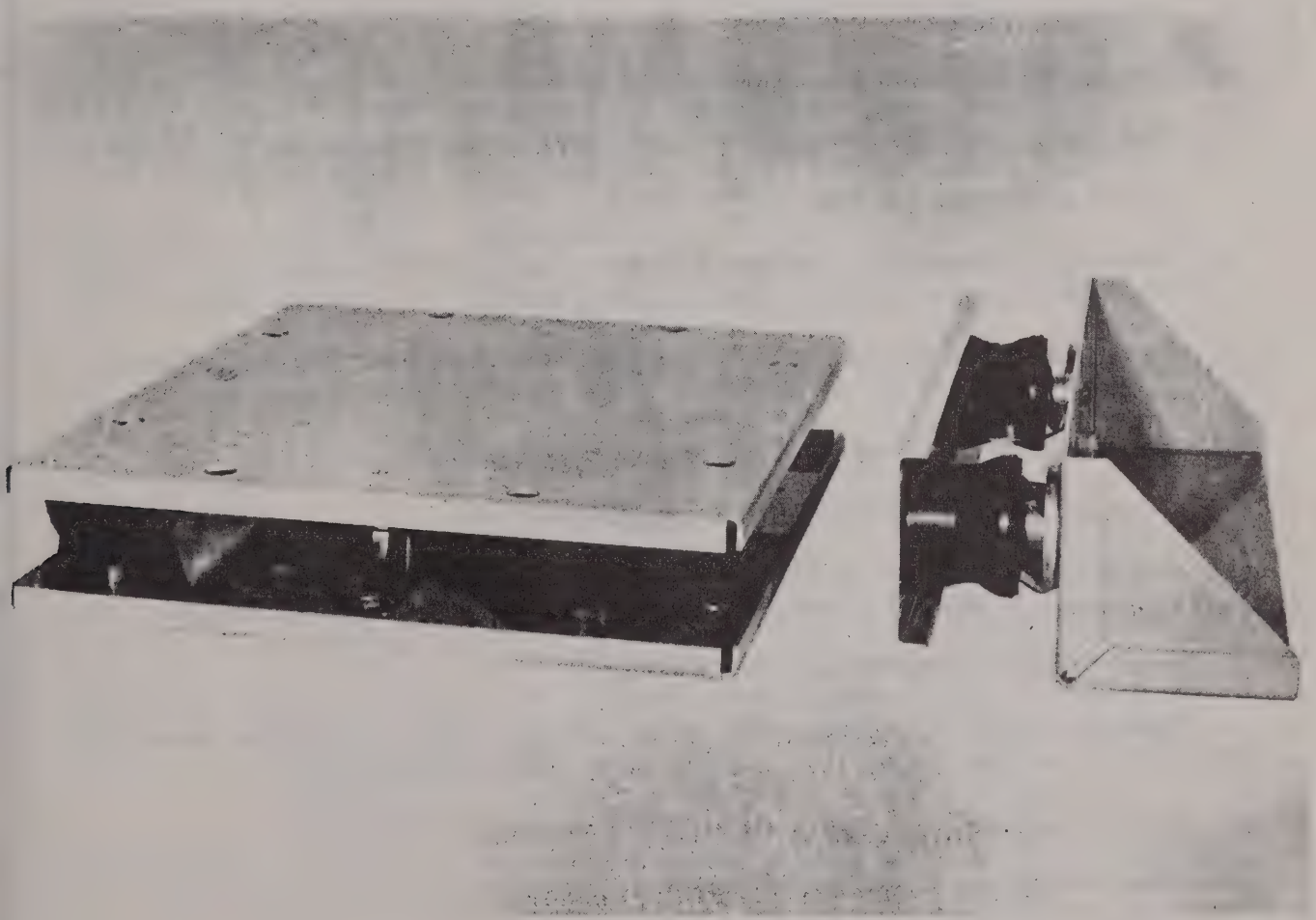


Figure 1-2. Electrical Equipment Shock Mount Base MT-3399/U

1-20. RADIO TRANSMITTER T-827/URT.

a. Frequency range: Model T-827/URT 2.000 to 29.9995 MC in 0.5 KC increments (56,000 channels). Model T-827A/URT and later models 2.000 to 29.9999 MC in 0.1 KC increments (280,000 channels).

b. Frequency stability: 1 part in 10^8 per day.

c. Modes of operation: USB, ISB, LSB, FSK, ISB/FSK (ISB with FSK on USB), CW, and compatible AM.

d. Type of frequency control: crystal controlled synthesizers referenced to a 5 megacycle internal or external frequency standard.

e. Intermodulation distortion: -35 DB maximum at 0.1 watt output.

f. Carrier suppression: 50 DB.

g. Power output: 0.1 watt nominal; 0.25 watt maximum.

h. Primary power requirements: 115 VAC ±10%, single phase, 48 to 450 CPS.

i. Power consumption: 65 watts.

j. CW mode: keyed carrier frequency.

k. FSK mode: 850 CPS total shift on a selectable center frequency (2000 or 2550 CPS).

l. Output impedance: 50 ohms.

m. Audio input impedance: Remote, 600 ohms; Local, carbon microphone (30 ohms nominal).

n. Teletypewriter loop current input: SPACE - 0 MA; MARK - 5 MA minimum, 60 MA maximum.

1-21. RADIO FREQUENCY AMPLIFIER AM-3924(P)/URT.

a. Frequency range: 2.0 to 30.0 MC in 19 bands.

b. Power output: 1 kilowatt PEP for USB, LSB, ISB and Compatible AM (250 watts of carrier) emissions; 1 kilowatt of average power for CW, FSK and FAX emissions.

c. Intermodulation distortion: -40 DB nominal.

d. Primary power: 115 volts ±10% line-to-line, 400 CPS, three phase, three-wire; or 208 or 440 volts ±10% line-to-line, 60 CPS, three phase, three-wire.

e. Power consumption: 4400 watts at rated full power output.

f. Heat dissipation: 3400 watts at rated full power output.

g. RF power input: 100 milliwatts nominal.

h. Tuning time: 10 seconds.

i. Ambient temperature limitations (during operation): 0 to 50 degrees C.

j. Required RF load: 50 ohms with a maximum VSWR of 4:1.

k. Diode, transistor, and tube complement:

DIODE	QTY	TRANSISTOR	QTY	TUBE	QTY
JAN1N277M	23	JAN2N297A	1	8122	2
JAN1N753A	9	JAN2N398A	5	4CX1500B/	2
JAN1N914	16	JAN2N404	3	8660	
JAN1N3000B	1	USN2N1132	3		
JAN1N3002B	3	JAN2N1309	1		
JAN1N3033B	2	JAN2N1613	16		
JAN1N3611	24				
TOTAL	78	TOTAL	29	TOTAL	4

1-22. POWER SUPPLY PP-3916/UR.

a. Primary input power: 208 volts ±10% line-to-line, 48 to 63 CPS, or 440 volts ±10% line-to-line, 60 CPS ±5%, three phase, 0.88 minimum power factor.

b. Power consumption: 4600 watts.

c. Power dissipation: 150 watts.

d. Output voltages:

(1) 115 volts, 60 CPS, single phase, 185 watts.

(2) 115 volts, 400 CPS, single phase, square wave, 70 watts.

(3) 500 VDC at 0.9 amperes.

(4) 2250 VDC at 1.2 amperes (unfiltered).

e. Diode and transistor complement:

DIODE	QTY	TRANSISTOR	QTY
D22-5001-000*	1	JAN2N1412	2
D22-5002-000*	2		
JAN1N3611	4		
1N4721	4		
TOTAL	11	TOTAL	2

*R F Communications, Inc. part number

1-23. POWER SUPPLY PP-3917/UR.

a. Primary input voltage: 115 volts ±10% line-to-line, 380 to 420 CPS, three phase, 0.88 minimum power factor.

b. Power consumption: 4600 watts.

c. Power dissipation: 150 watts.

d. Output voltages:
(1) 115 volts, 60 CPS, single phase, square wave, 40 watts.
(2) 115 volts, 400 CPS, single phase, 215 watts.
(3) 500 VDC at 0.9 amperes.
(4) 2250 VDC at 1.2 amperes (unfiltered).

e. Diode and transistor complement:

DIODE	QTY	TRANSISTOR	QTY
D22-5001-000* D22-5002-000* JAN1N3611	1 2 3	2N2290	2
TOTAL	6	TOTAL	2

*R F Communications, Inc. part number

1-24. EQUIPMENT SUPPLIED.

1-25. The equipment supplied as a part of each of the four AN/URT-23(V) configurations is listed in table 1-1.

1-26. TYPICAL EQUIPMENT, CABLES, AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED.

1-27. Typical equipment, cables, and publications required but not supplied as part of the AN/URT-23(V) are listed in table 1-2. The exact requirements will depend on the configuration being used. If the indicated test equipment is not available, use an equivalent substitute.

1-28. FACTORY OR FIELD CHANGES.

1-29. No factory changes have been made to the AN/URT-23(V). Table 1-3 provides a list of field changes that should be made.

TABLE 1-1. RADIO TRANSMITTING SET AN/URT-23(V) EQUIPMENT SUPPLIED

QTY PER CONFIGURATION				NOMENCLATURE		UNIT NO.	OVERALL DIMENSIONS (IN.)			VOLUME (FT^3)	WEIGHT (LBS)
1	2	3	4	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
1	1	1	1	Radio Frequency Amplifier	AM-3924(P)/URT	1	12.36	17.38	20.00	2.36	95 (1)
(2)	(2)	(2)	(2)	Power Supply	PP-3917/UR	1A1A8	(2)	(2)	(2)	(2)	30
1	1	0	0	Power Supply	PP-3916/UR	2	7.11	17.38	19.90	1.36	145
1	0	1	0	Radio Transmitter	T-827/URT	3	7.11	17.38	19.40	1.34	70
1	1	1	1	Electrical Equipment Shock Mount Base	MT-3399/U	4	3.5 (3)	19.69	16.88	0.70	20
1	0	1	0	Handset (including cord and plug assembly)	H-169/U (with CX-1846A/U)						
1	0	1	0	Kit, Extender Test Cables (4)							
1	0	1	0	Interconnecting Cable	W1						

(1) Does not include weight of subassembly PP-3917/UR
(2) Optional Unit, which when supplied is a subassembly of the AM-3924(P)/URT
(3) Shock Mount height is with load applied
(4) Used for maintenance of T-827/URT modules

TABLE 1-1. RADIO TRANSMITTING SET AN/URT-23(V) EQUIPMENT SUPPLIED (Cont)

QTY PER CONFIGURATION				NOMENCLATURE		UNIT NO.	OVERALL DIMENSIONS (IN.)			VOLUME (FT^3)	WEIGHT (LBS)
1	2	3	4	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
1	0	1	0	Interconnecting Cable	W2						
1	1	0	0	Interconnecting Cable	W3						
1	1	1	1	Connector	10-109618-1P (5)						
1	1	1	1	Connector	10-109620-19S (5)						
1	1	1	1	Connector	10-109628-12P (5)						
0	1	0	1	Connector	10-109628-21P (5)						
1	0	1	0	Connector	MS3106E-16S-5S						
2	0	2	0	Connector	MS3106E-10SL-4S						
1	0	1	0	Connector	MS3106E-14S-2S						
0	1	0	1	Connector	UG-88E/U						
1	1	1	1	Connector	UG-941B/U						
1	1	1	1	Connector	UG-982/U						
2	2	2	2	Technical Manual	NAVSHIPS 0967-191-7010						

(5) Refer to Bureau of Ships drawing RE49D769

TABLE 1-1. RADIO TRANSMITTING SET AN/URT-23(V) EQUIPMENT SUPPLIED (Cont)

QTY PER CONFIGURATION				NOMENCLATURE		UNIT NO.	OVERALL DIMENSIONS (IN.)			VOLUME (FT^3)	WEIGHT (LBS)
1	2	3	4	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
1	1	1	1	Operator's Instruction Chart	NAVSHIPS 0967-191-7020						
1	1	1	1	Performance Standards Sheet	NAVSHIPS 0967-191-7030						
1	1	1	1	Reference Standards Book	NAVSHIPS 0967-191-7040						
2	0	2	0	Technical Manual	NAVSHIPS 0967-032-0010						
2	0	2	0	Technical Manual	NAVSHIPS 0967-032-0020						
1	0	1	0	Maintenance Standards Book	NAVSHIPS 0967-032-0030						
4	3	3	2	Screw	MS51959-63						
1	1	1	1	Support Clamp	10-36233-183 (5)						
1	1	1	1	Support Clamp	10-36233-203 (5)						
1	2	1	2	Support Clamp	10-36233-243 (5)						

(5) Refer to Bureau of Ships drawing RE49D769

TABLE 1-1. RADIO TRANSMITTING SET AN/URT-23(V) EQUIPMENT SUPPLIED (Cont)

QTY PER CONFIGURATION				NOMENCLATURE		UNIT NO.	OVERALL DIMENSIONS (IN.)			VOLUME (FT^3)	WEIGHT (LBS)
1	2	3	4	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
3	2	2	1	Ground Cable	391-0021 (6)						
(7)	(7)	(7)	(7)	Sealed Plug Assembly	391-9040 (6)						

(6) R F Communications, Inc. part number

(7) Used only when the PP-3917/UR is used

TABLE 1-2. RADIO TRANSMITTING SET AN/URT-23(V), TYPICAL EQUIPMENT, CABLES, AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	Antenna System	Broadband Antenna, Multicoupler, or Antenna Coupler Group AN/URA-38 for surface ship and shore installations. Antenna Tuner AN/BRA-11 or 21 for submarine installations.	Radiation of RF Signals	Frequency Range: 2 to 30 MC Output Impedance: 50 ohms Power Input: 1 KW Average Maximum VSWR: 4:1
1	Cable Set		Interconnection of Equipment	Fabricate according to paragraph 2-23
1	Teletypewriter Panel	TT-23/SG (or equiv.)	FSK Operation	
1	Teletypewriter Control Panel	C-1004/SG (or equiv.)	FSK Operation	
1	Teletypewriter Power Supply	PP-3494/U (or equiv.)	FSK Operation	
1	Key Control Panel	SB-315/U (or equiv.)	Keying for CW Operation	
3	Radio Remote Control	C-1138/UR (or equiv.)	Shipboard Remote Control Operation	
1	CW Key*		Local Keying for CW Operation	

*Optional

TABLE 1-2. RADIO TRANSMITTING SET AN/URT-23(V), TYPICAL EQUIPMENT, CABLES, AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Cont)

QTY PER EQUIP	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	Oscilloscope	AN/USM-117	Maintenance, Adjustment, and Troubleshooting Procedures	Frequency: DC to 30 MC Sensitivity: 0 to 250 VAC P-P 0.1 to 300 VDC Input Impedance: 1 megohm
1	Radio Test Set	AN/TRM-3	Alignment Procedures	Frequency Range: 1 to 35 MC Sweep: 1 MC to 5 MC Marker Frequency Inserts: 0.5, 1.0 and 5.0 MC Output: Voltage: 1V RMS, MAX Impedance: 50 ohms
1	Electrical Dummy Load	DA-242/U	Maintenance, Adjustment, and Troubleshooting Procedures	Input Impedance: 50 ohm, coaxial Power: 2.5 KW RF from 2 to 30 MC
1	Video Transfer Oscillator	AN/URM-153	To extend Frequency Range of AN/TRM-3	

TABLE 1-2. RADIO TRANSMITTING SET AN/URT-23(V), TYPICAL EQUIPMENT, CABLES, AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Cont)

QTY PER EQUIP	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	Two-Tone Audio Signal Generator	SG-376/U	Maintenance and Adjustment Procedures	Frequency Range: 20 CPS to 3000 CPS Output Voltage: 0 to 150 millivolts/tone Output Impedance: 600 ohms
2	Electronic Multimeter	AN/USM-116	Maintenance, Adjustment, and Troubleshooting Procedures	Frequency Range: 2 to 30 MC Voltages: 1 to 250 VAC Input Impedance: 10 megohms
1	Multimeter	AN/PSM-4	Maintenance, Adjustment, and Troubleshooting Procedures	Frequency Range: 0 to 500 CPS Voltages: 0 to 600 VDC 0 to 500 VAC RMS Input Impedance: DC: 20,000 ohms per volt AC: 5,000 ohms per volt
1	Signal Generator	SG-582/U	Maintenance, Adjustment, and Troubleshooting Procedures	Frequency Range: 2 to 30 MC Output Voltage: 2.5 VAC Output Impedance: 50 ohms

TABLE 1-2. RADIO TRANSMITTING SET AN/URT-23(V), TYPICAL EQUIPMENT, CABLES, AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Cont)

QTY PER EQUIP	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	Electronic Multimeter	ME-6D/U	Maintenance Procedures	Voltages: 0 to 200 MV Frequency Range: 2 to 30 MC
1	Keying Fixture		Maintenance, Adjustment, and Troubleshooting Procedures	Fabricate according to paragraph 2-32
1	Set of Rack Mounting Brackets		Installation of Equipment	Fabricate according to paragraph 2-17.
1	Exhaust Hood or Duct System		Installation of Equipment	Fabricate according to paragraph 2-21.
1	Detector Test Fixture		Adjustment Procedures	Fabricate according to paragraph 5-18.
1	Set of Indexing Jigs		Maintenance Procedures	Fabricate according to paragraph 5-46.
1	Set of Printed Circuit Board Extenders		Troubleshooting Procedures	Fabricate according to paragraph 5-44.
1	Alignment Tool		Adjustment Procedures	Standard 0.100 hex-end, non-metallic, with undercut shaft
1	Standard Tool Set		Installation, Maintenance, and Adjustment Procedures	

TABLE 1-2. RADIO TRANSMITTING SET AN/URT-23(V), TYPICAL EQUIPMENT, CABLES, AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED (Cont)

QTY PER EQUIP	NOMENCLATURE		REQUIRED USE	EQUIPMENT CHARACTERISTICS
	NAME	DESIGNATION		
1	Instruction Book for AN/USM-117		Maintenance and Troubleshooting Procedures	
1	Instruction Book for AN/TRM-3		Maintenance and Troubleshooting Procedures	
1	Instruction Book for AN/URM-153		Maintenance and Troubleshooting Procedures	
1	Instruction Book for SG-376/U		Maintenance and Troubleshooting Procedures	
1	Instruction Book for AN/USM-116		Maintenance and Troubleshooting Procedures	
1	Instruction Book for AN/PSM-4		Maintenance and Troubleshooting Procedures	
1	Instruction Book for SG-582/U		Maintenance and Troubleshooting Procedures	
1	Instruction Book for ME-6D/U		Maintenance and Troubleshooting Procedures	

TABLE 1-3. FIELD CHANGES

FIELD CHANGE NUMBER	FIELD CHANGE TITLE AND PURPOSE	SERIAL NUMBER AFFECTED	IDENTIFICATION OF ACCOMPLISHMENT
1-H-169/U	Modification for keying sequence. Eliminates a full-power keying transient when the T-827/URT is unkeyed.	All that are used with the AN/URT-23(V), including those at remote control units.	Identified by the absence of a loud receiver "click" when the T-827/ URT is unkeyed.

1-30. EQUIPMENT SIMILARITIES.

1-31. Two separate versions of the T-827/URT may be used in the AN/URT-23(V). Model T-827/URT tunes from 2.0 to 29.9995 MC in 500 CPS increments (56,000 channels). Model T-827A/URT and later models tune from 2.0 to 29.9999 MC in 100 CPS increments (280,000 channels). This manual contains installation and operation instructions for the T-827/URT as a part of the AN/URT-23(V). For more complete information on the T-827/ URT refer to NAVSHIPS 0967-032-0010, Technical Manual for Radio Transmitter T-827/URT.

1-32. Instructions for installation of Antenna Coupler Control C-3698/URA-38, and for operation of Antenna Coupler Group AN/URA-38 in conjunction with the AN/URT-23(V) are contained in this manual. For more complete information on Antenna Coupler Group AN/URA-38, refer to NAVSHIPS 0967-204-0010, Technical Manual for Antenna Coupler Group Group AN/URA-38.

1-33. PREPARATION FOR RESHIPMENT.

1-34. The AN/URT-23(V) is shipped complete in one shipping container. To prepare the AN/URT-23(V) for reshipment, remove all interconnecting cables and accessories connected to the units. Remove the stacked units from the MT-3399/U and bolt the MT-3399/U to the top of the equipment stack, cover the equipment stack with a waterproof cover and bolt the stack to a shipping pallet. Pack all Technical Manuals, interconnecting cables, accessories, etc. into a cardboard container and place on top of equipment stack. Crate system in accordance with applicable specifications.

TABLE 1-4. FACTORY CHANGES

FACTORY CHANGE NUMBER	FACTORY CHANGE TITLE AND PURPOSE	SERIAL NO. AFFECTED	INDICATION OF ACCOMPLISHMENT
1-AN/URT-23(V)	Addition of 1A1A3L2. To flatten frequency response of Power meter 1A1M2.	All except A3 and A4	None Apparent
2-AN/URT-23(V)	Change value of 1A1A2C38 from 110 PF to 75 PF and 1A1A2C39 from 110 PF to 150 PF. To increase current rating.	All except A5, A6, A8, A9, A10, A13.	None Apparent
3-AN/URT-23(V)	Delete resistor 1A1A6R20, add diode 1A1A6CR29 (1N914), and change 1A1A6R18 from 180 ohms to 820 ohms. To eliminate excessive leakage from 1A1A6Q19 at high temperature.	All except A5 through A71.	None Apparent
4-AN/URT-23(V)	Change value of 1A1A2C28 from 1000 PF to 820 PF. To improve response characteristics of 3.0 to 3.5 MC band.	All except A3 through A145	None Apparent

SECTION 2

INSTALLATION

2-1. UNPACKING AND HANDLING.

2-2. HANDLING.

2-3. The AN/URT-23(V) is shipped in a single crate, with all units attached to each other. The approximate shipping weight of the equipment is 500 pounds. Provisions will be required for loading, transportation, unloading, and setting the AN/URT-23(V) in place.

2-4. UNPACKING.

2-5. No special procedures are required for unpacking the AN/URT-23(V). However, since the equipment is made up of accurately calibrated precision units, rough handling should be avoided. Caution should be taken when removing sections of the packing carton to prevent damage to the controls, indicators, and connectors. For shore installations where the MT-3399/U is not used, return the MT-3399/U to stock supply for spare support.

2-6. POWER REQUIREMENTS.

2-7. The AN/URT-23(V) can be operated from any one of the three primary power sources listed in a through c below. For any of the voltage and frequency combinations listed, the AN/URT-23(V) requires a three phase, three wire primary power source which will supply 4600 watts with a minimum power factor of 0.88. When shipped, the AN/URT-23(V) is wired and fused for operation from a 440 volt, 60 CPS primary power source. Paragraph 2-19 describes the wiring and fuse changes required for operation from any of the possible power sources listed below. Primary power distribution within the AN/URT-23(V) is shown in figures 5-21 and 5-22.

a. 115 volts line-to-line ±10%, 400 CPS ±5%, three phase, three wire.

b. 208 volts line-to-line ±10%, 48 to 63 CPS, three phase, three wire.

c. 440 volts line-to-line ±10%, 60 CPS ±5%, three phase, three wire.

Note

When operating from the source described in a above, Power Supply PP-3917/UR is used. When operating from the sources described in b and c above, Power Supply PP-3916/UR is used.

2-8. SITE SELECTION.

2-9. In selecting a shipboard installation site, adequate consideration must be given to space requirements (figure 2-1). This requirement will include space for servicing the slide-mounted T-827/URT and AM-3924 (P)/URT when extended from their cases, and cable bends. In addition, during 400 CPS operation the stack must be mounted at least four inches

above deck to allow the AM-3924 (P)/URT chassis (when extended from case) to be rotated upwards for servicing. If the exhaust from the AM-3924 (P)/URT is to be ducted out of the area, adequate space must be allowed for the connection of the necessary ductwork to the rear of the AM-3924 (P)/URT.

2-10. When selecting a shore installation site, similar considerations must be given to the space requirements. In addition, the equipment should be located so that the antenna can be mounted high enough to clear any surrounding hills, woods, or buildings. Also, the antenna should be located as far as possible from any high power transmission lines to prevent interference.

2-11. INSTALLATION REQUIREMENTS.

Note

The AM-3924 (P)/URT can be modified for use in a special two-exciter system. The field change installation of additional circuitry will permit front panel switching of the RF input of the AM-3924(P)/URT from the T-827/URT to a second exciter (paragraph 2-40).

2-12. CONSIDERATIONS.

2-13. The following factors should be considered when determining the proper location of the system.

a. Best operating conditions.

b. Ease of maintenance, adjustment of equipment, and replacement and repair of defective parts or complete units.

c. Possibility of interaction between units and other electronic equipment in the vicinity.

d. Adequate heat dissipation (including convenience of duct installation, if desired).

e. Availability of an appropriate primary power source.

f. Availability of an adequate ground.

g. Accessibility of antenna systems.

2-14. INSTALLATION PROCEDURES.

2-15. The installation procedures vary with the configuration (rack or stack mounted), the number of units in the configuration, the primary power source available, and the ship in which the system is installed. The following paragraphs provide all the information required to install the AN/URT-23(V) for any type of installation.

2-16. STACK MOUNTING. The AN/URT-23(V) is shipped with the units stacked. To install the equipment in a stack-mounted configuration, proceed as follows:

a. Select a location for the equipment, after considering all the factors listed in paragraph 2-12.

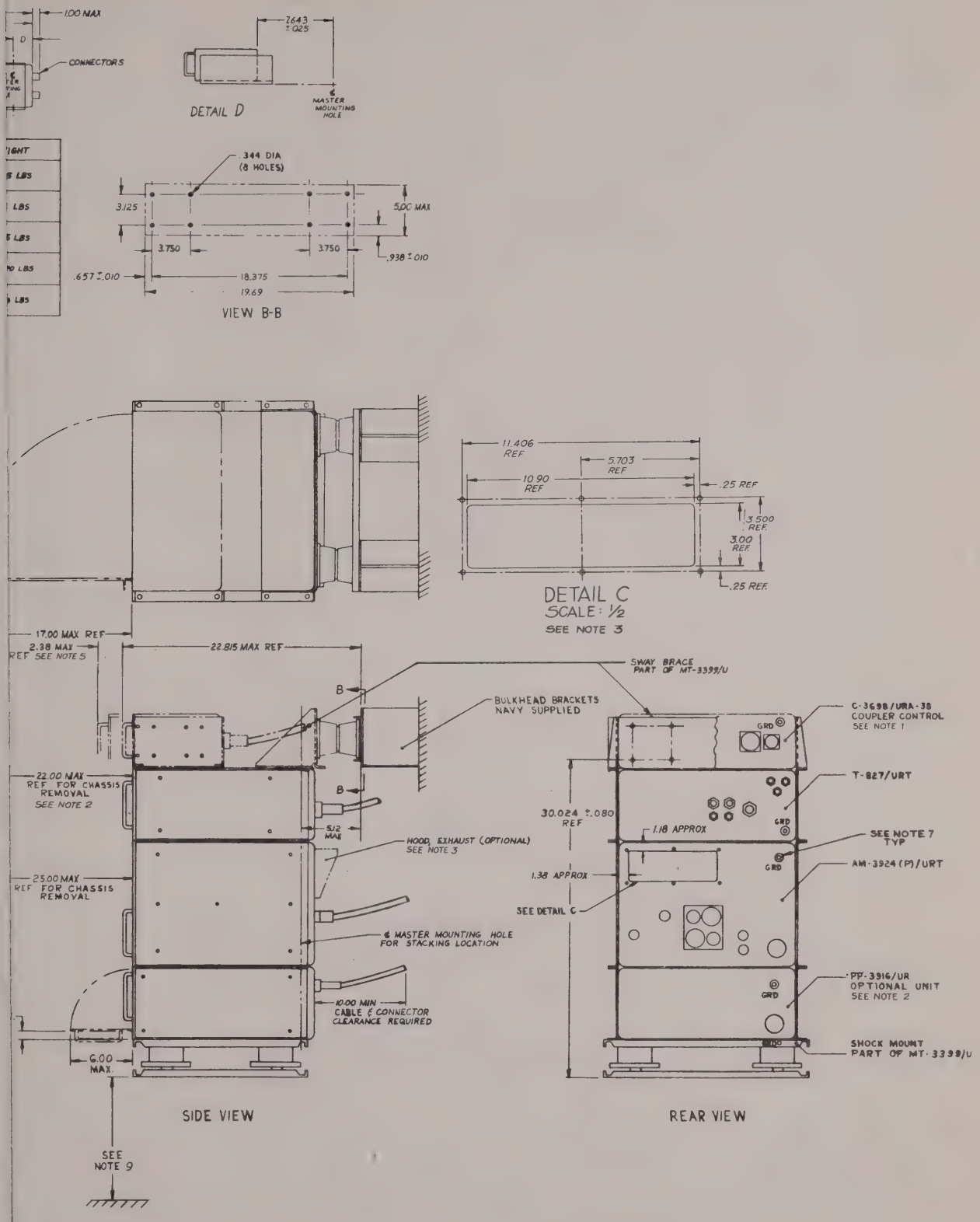


Figure 2-1. Radio Transmitting Set AN/URT-23(V), Outline and Mounting Dimensions

above deck to allow the AM-3924 (P)/URT chassis (when extended from case) to be rotated upwards for servicing. If the exhaust from the AM-3924 (P)/URT is to be ducted out of the area, adequate space must be allowed for the connection of the necessary ductwork to the rear of the AM-3924 (P)/URT.

2-10. When selecting a shore installation site, similar considerations must be given to the space requirements. In addition, the equipment should be located so that the antenna can be mounted high enough to clear any surrounding hills, woods, or buildings. Also, the antenna should be located as far as possible from any high power transmission lines to prevent interference.

2-11. INSTALLATION REQUIREMENTS.

Note

The AM-3924 (P)/URT can be modified for use in a special two-exciter system. The field change installation of additional circuitry will permit front panel switching of the RF input of the AM-3924(P)/URT from the T-827/URT to a second exciter (paragraph 2-40).

2-12. CONSIDERATIONS.

2-13. The following factors should be considered when determining the proper location of the system.

a. Best operating conditions.

b. Ease of maintenance, adjustment of equipment, and replacement and repair of defective parts or complete units.

c. Possibility of interaction between units and other electroric equipment in the vicinity.

d. Adequate heat dissipation (including convenience of duct installation, if desired).

e. Availability of an appropriate primary power source.

f. Availability of an adequate ground.

g. Accessibility of antenna systems.

2-14. INSTALLATION PROCEDURES.

2-15. The installation procedures vary with the configuration (rack or stack mounted), the number of units in the configuration, the primary power source available, and the ship in which the system is installed. The following paragraphs provide all the information required to install the AN/URT-23(V) for any type of installation.

2-16. STACK MOUNTING. The AN/URT-23(V) is shipped with the units stacked. To install the equipment in a stack-mounted configuration, proceed as follows:

a. Select a location for the equipment, after considering all the factors listed in paragraph 2-12.

NOTES:

2

1. Optional mounting for coupler control unit C-3698/URA-38.

2. Dimensions shown on right side view (6.00, 25.00, 22.00) indicate clearance necessary to remove chassis from their respective cases. Clearance for withdrawal and tilting of chassis is within these limits.

3. Detail C represents six no. 6-32 tapped holes to facilitate mounting of exhaust air removal duct if required. Depth of screw penetration .100 inch maximum. Flow rate of exhaust air from AM-3924(P)/URT is 120 CFM. Exterior exhaust duct shall have inlet pressure no greater than 14.7 psi absolute at 120 CFM. Refer to Figure 2-3 for exhaust hood fabrication, for installations not provided with exhaust air ducting.

4. If armored cables are used for interconnection, armor shall be cut back 10 inches from connector to avoid undesired stresses on MT-3399/U caused by cable stiffness.

5. Sway and lean clearance for equipment on shock mount is 2.38 inches in all directions when 4 units are mounted as shown. Cable clearance shown at rear is adequate for sway and lean on shock mount.

6. View B-B provides mounting hole template for sway brace installation.

7. Screw type bonds should be used to ground equipment cases at the points furnished and marked on the rear of each unit. (Solid copper ground straps preferred to braided type).

8. Amplifier AM-3924(P)/URT requires 8.5 inches bottom clearance for tilting chassis when it is extended out from the case on its slides.

b. Prepare a mounting surface for the equipment stack. The equipment stack must be a minimum of four inches above the deck when the PP-3916/UR is not used (400 CPS primary power source).

c. Using the dimensions shown in view A-A of figure 2-1, drill eight 0.297 inch diameter holes for securing the shock mount base plate to selected mounting surface.

d. Remove the AN/URT-23(V) from the shipping carton.

e. Remove the MT-3399/U from the top of the stack. Save hardware.

f. Set MT-3399/U on mounting surface and bolt in place using 1/4-20 hardware (to be supplied by the installing activity).

g. Lift and slowly lower the equipment stack onto the MT-3399/U and secure using the hardware removed from the MT-3399/U in step e.

CAUTION

The high center of gravity of the stacked units of the AN/URT-23(V) requires restriction of lateral motion. A sway brace is included as part of the MT-3399/U for this prupose.

h. Attach the swaybrace to the top unit of the AN/URT-23(V) with 5/16-18 hardware (to be supplied by the installing activity).

i. Measure the distance from the sway brace vibration isolators to the bulkhead (figure 2-1). Using the dimensions shown in view B-B of figure 2-1, modify bulkhead as required to interface with the sway brace. Secure swaybrace to bulkhead, using 5/16-18 hardware (to be supplied by the installing activity).

j. If used, position the C-3698/URA-38 as shown (phantom) in figure 2-1 and secure by bolting the mounting brackets to the top of the T-827/URT mounting brackets.

k. Refer to paragraph 2-19 and install the proper primary power jumpering and fusing.

l. Install cable and ground connections according to paragraph 2-22.

2-17. RACK MOUNTING. The units can be rack mounted in Cabinet Electrical Equipment CY-4516/S (or equivalent). To accomplish this, rack mounting brackets must be fabricated. Figure 2-2 provides all information required to fabricate the rack mounting brackets for shore installations. For shipboard installations a special installation "kit" (supplied by the installing activity) will be required. To install the equipment in the CY-4516/S, proceed as follows:

a. Remove the AN/URT-23(V) from the shipping container.

b. Remove the mounting bolts and separate the units.

c. Remove the stack mounting brackets from the sides of each unit. Return stack mounting brackets and MT-3399/U to stock supply.

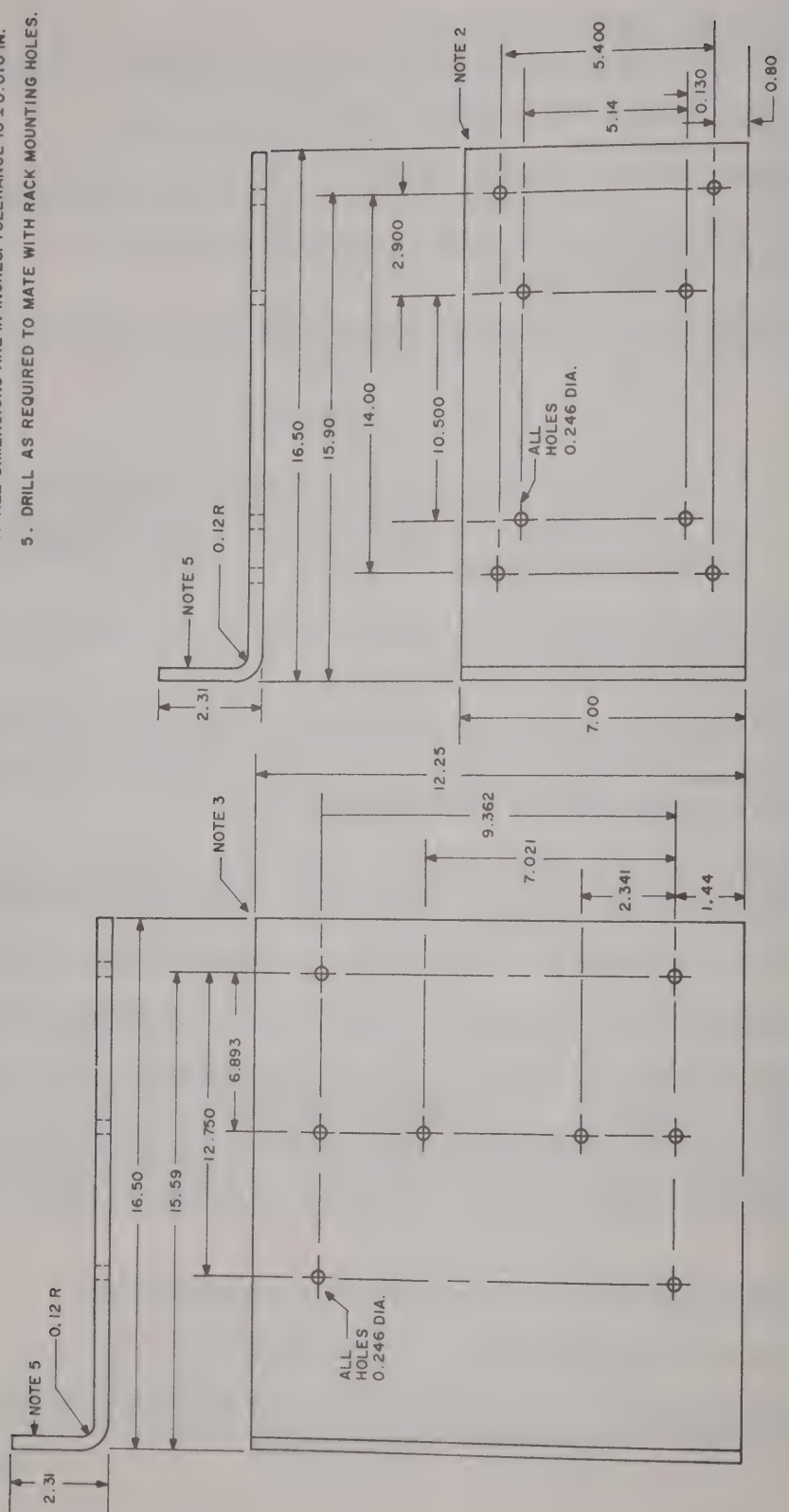


Figure 2-2. Rack Mounting Bracket Fabrication Details for Shore Installations

d. For shore installations, use the information contained in figure 2-2 to fabricate rack mounting brackets for each unit. For shipboard installations, obtain a special CY-4516/S shipboard installation kit from stock supply.

e. Attach the fabricated rack mounting brackets to the sides of the units. Slide each unit into the cabinet, and secure (mounting hardware to be supplied by the installing activity).

Note

It is advisable to use the same installation configuration used for stack mounting (figure 2-1) so that supplied cables will reach.

f. Refer to paragraph 2-19 and install the proper primary power jumpering and fusing. Confirm any special instruction as may be supplied with the special CY-4516/S installation kit.

g. Install cable and ground connections according to paragraph 2-22.

2-18. POWER SUPPLY PP-3917/UR. The PP-3917/UR (optional accessory unit) is used only when the equipment is operated from a 400 CPS primary power source. When operating from a 60 CPS power source, the PP-3917/UR must be removed (if installed) from the AM-3924 (P)/URT. To install the PP-3917/UR into the AM-3924 (P)/URT proceed as follows:

WARNING

Do not extend the AM-3924 (P)/URT chassis from the case unless the case is securely mounted.

a. Loosen the eight captive screws on the AM-3924 (P)/URT front panel and slide the chassis out from the case until the chassis slides lock.

WARNING

Ensure that no primary power is connected to the AM-3924 (P)/URT.

b. Release the chassis slide tilt locks, rotate chassis upward 90° until locks engage.

c. Remove high voltage protective cover over 1A1TB1 and 1A1TB2 (figure 5-8).

d. Remove jumpering strip from 1A1TB2 (if present).

e. Set PP-3917/UR into the space provided on left side of the AM-3924 (P)/URT chassis underside and secure with 5 captive screws.

f. Connect PP-3917/UR cable harness fanning strips 1A1A8P1 and 1A1A8P2 (figure 5-18) to terminal boards 1A1TB1 and 1A1TB2, respectively.

g. Replace the high voltage protective cover over 1A1TB1 and 1A1TB2 (figure 5-8).

h. Mate the sealed plug assembly supplied with the PP-3917/UR to connector 1A2J1 on the rear of the AM-3924 (P)/URT case.

i. Refer to paragraph 2-19 and make the necessary fusing and jumpering changes.

2-19. PRIMARY POWER JUMPERING AND FUSING. The AN/URT-23(V) can be operated from any one of the three primary power sources listed in paragraph 2-7. As shipped, the equipment is wired and fused for 440 volts 60 CPS primary power. If one of the other primary power sources is to be used, the equipment must be converted for operation from the new source. This conversion may consist of substituting jumpering strips on terminal boards within the AM-3924 (P)/URT, and the PP-3916/UR (when used). It may also consist of changing the primary fuses in the AM-3924 (P)/URT and/or exchanging power supplies. The procedure below refers to table 2-1 which contains the different combinations of changes to be made. Figures 5-21 and 5-22, which show primary power distribution, will assist in understanding the changes to be made. The information listed below will assist in locating the terminal boards.

Note

Only one high voltage power supply is required. When converting an installation, remove the supply which no longer can be used from the installation and substitute with the required supply from stock. (The PP-3916/UR is used for 60 CPS primary power and the PP-3917/UR is used for 400 CPS primary power.)

a. Terminal boards 1A1TB1 and 1A1TB2 are located at the bottom left of the AM-3924 (P)/URT chassis under the high voltage protective cover nearest driver transformer assembly 1A1A4 (figure 5-8).

b. Terminal board 1A1TB4 is located on a bracket under the high voltage protective cover on the top of the AM-3924 (P)/URT chassis at the left side (figure 5-7).

c. The three primary power fuses are located on the front panel of the AM-3924 (P)/URT (figure 3-2).

d. Terminal board 2A2TB1 is located inside the PP-3916/UR case on the bottom directly behind the hinged front panel (figure 5-20).

e. Fanning strips 1A1A8P1 and 1A1A8P2 are integral parts of the PP-3917/UR cable harness (figure 5-18).

2-20. To convert the AN/URT-23(V) for operation from a new power source (one of the three listed in paragraph 2-7), proceed as follows:

WARNING

Ensure that primary power is not connected to the AM-3924 (P)/URT. Failure to do so will cause unswitched primary power to be present at the exposed terminals.

TABLE 2-1. PRIMARY POWER JUMPER CONNECTIONS AND FUSES.

EQUIPMENT	TERMINAL BOARD OR FUSEHOLDER	MATING PLUG OR FUSE		
		440 VOLTS 60 CPS PRIMARY POWER	208 VOLTS 60 CPS PRIMARY POWER	115 VOLTS 400 CPS PRIMARY POWER
AM-3924(P)/URT	1A1TB1	NONE	NONE	1A1A8P1
	1A1TB2	1A1P5	1A1P5	1A1A8P2
	1A1TB4	1A1P3	1A1P2	1A1P1
	PRIMARY FUSES (3 ea.)	6 AMP	15 AMP	25 AMP
PP-3916/UR	2A2TB1	2A1P1	2A1P2	NONE

Note

For each step in the procedure, refer to table 2-1, and compare the information for the line voltage for which the set is presently connected with the information given for the line voltage to which the set is to be converted. For some steps the information will probably be the same, and no change in wiring configuration will be required.

a. Note the frequency of the intended primary power source. The PP-3916/UR will be required for 60 CPS operation, or PP-3917/UR will be required for 400 CPS operation. If necessary, requisition the required power supply from stock supply and install it (paragraph 2-14 or 2-18).

b. Loosen the eight front panel captive screws and slide the AM-3924(P)/URT chassis out from the case until the chassis slides lock.

c. Locate terminal boards 1A1TB1, 1A1TB2, and 1A1TB4, and ensure that proper jumpering strips are installed for the new intended primary power source according to the information in table 2-1.

d. Determine that the fuses in the three primary fuse holders on the AM-3924(P)/URT front panel have the proper current rating according to table 2-1.

e. Slide the AM-3924(P)/URT chassis back into the case, and secure with the eight captive front panel screws.

f. If operation is intended from a 60 CPS source, open the front panel of the PP-3916/UR and ensure that the proper jumpering strip is installed on 2A1TB1 according to table 2-1.

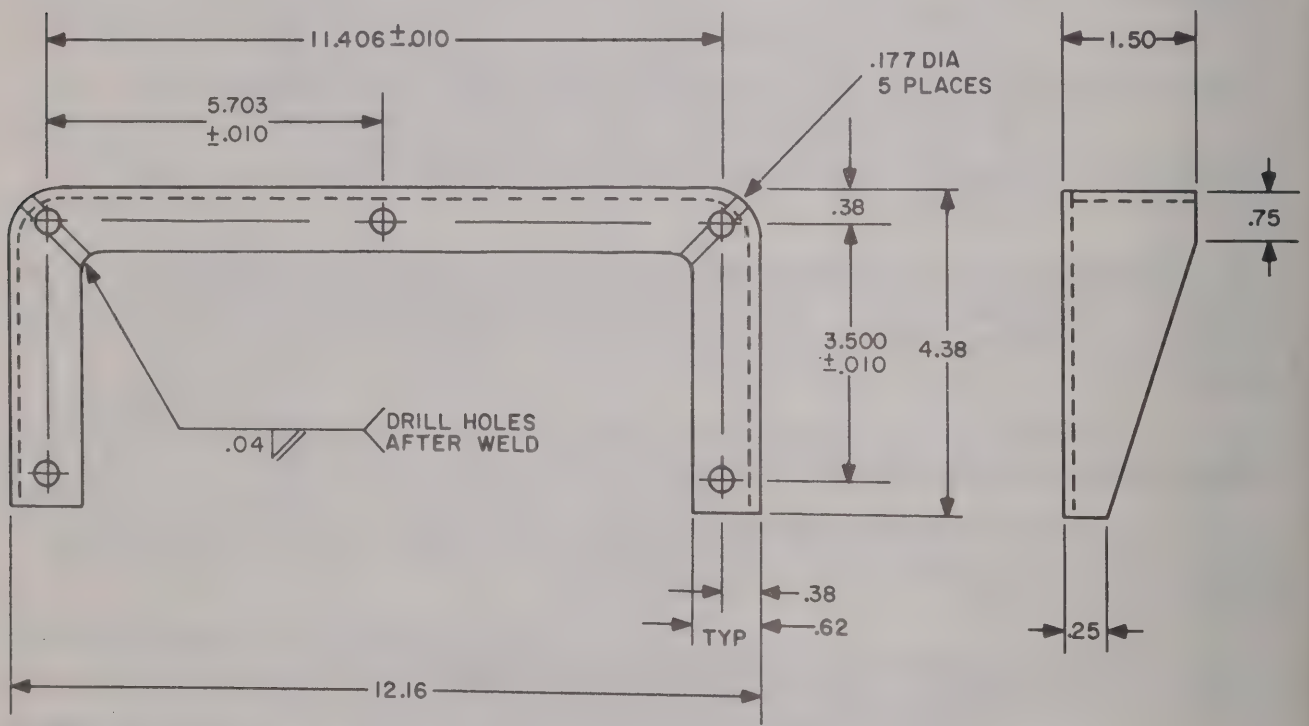
g. Close and secure the front panel of the PP-3916/UR with the five front panel captive screws.

2-21. COOLING. Precautions should be taken to ensure that nothing obstructs the AM-3924 (P)/URT front panel air intake filter or the air exhaust at rear of the case. If exhaust air is ducted, provisions (such as a booster fan in the duct work) must be made to compensate for the impedance of the duct work so that a minimum of 120 CFM of air flows through the air exhaust on the rear of the case. Six holes, tapped for 6-32 hardware, are provided on the perimeter of the AM-3924 (P)/URT exhaust port for attachment of the duct (figure 2-1). Length of 6-32 screws must be choosen to prevent interference with rubber gasket on far side of exhaust port (figure 2-1). If no ducting is to be used, and the units will be exposed to the elements, an exhaust hood should be fabricated using the information provided in figure 2-3. The hood should then be attached to the AM-3924 (P)/URT exhaust port with 6-32 screws as shown in figure 2-1.

2-22. INTERCONNECTION REQUIREMENTS.

2-23. CABLE ASSEMBLIES.

2-24. Differences in system configurations and variations among installations will control the number and length of cables connected to the AN/URT-23(V). For these reasons, only up to three fabricated cables (table 1-1) and ground straps (depending on equipment configuration) are supplied as part of the AN/URT-23(V). Mating connectors for all other system connections are supplied. The installing activity furnishes all other materials and fabricates the required cables. Tables 2-2 through 2-9 list connector termination information. Refer to the applicable technical manuals for cable terminations in auxiliary and ancillary equipments.



NOTES:

1. REMOVE BURRS & SHARP EDGES .010 MAX
2. MATERIAL: 5052-H32 ALUM. ALY PER QQ-A-250/8 (.040 THK)
3. FINISH: IRIDITE PER MIL-C-5541
4. TOLERANCE: XX ±.020; XXX ±.005

Figure 2-3. Exhaust Hood Fabrication Details

TABLE 2-2. CABLE TYPES AND TERMINATIONS

NO.	FROM	MATING CONNECTOR	CABLE TYPE	MATING CONNECTOR	TO	REMARKS
W1	AM-3924(P)/URT J9	UG-88E/U	RG-223/U coaxial	UG-88E/U	T-827/URT J23	Supplied as part of AN/URT-23(V)
W2	AM-3924(P)/URT J7	10-109628-21P	Multiconductor	MS3116J-22S-55S	T-827/URT J4	Supplied as part of AN/URT-23(V). See Table 2-3 for pin connections.
W3	AM-3924(P)/URT J1	10-109628-17P	Multiconductor	10-109628-17S	PP-3916/UR J1	Supplied as part of AN/URT-23(V). See Table 2-4 for pin connections.
W4	AM-3924(P)/URT J5	10-109620-19S	Multiconductor (TSGA type)	-	Primary power source	See Table 2-5 for pin connections.
W5	AM-3924(P)/URT J6	10-109620-27P	Multiconductor	10-109620-27S	C-3698/URA-38 J1	Supplied as AN/URA-38 cable W1. See Table 2-6 for pin connections.
W6	AM-3924(P)/URT J4	UG-941B/U	RG-214/U coaxial	-	Receiver antenna	When transmitter antenna is used for receiver.
W7	AM-3924(P)/URT J2	10-109628-12P	Multiconductor (MSCA Type)	-	Transmitter Switchboard	See Table 2-7 for pin connections.
W8	AM-3924(P)/URT J3	UG-982/U	RG-219/U coaxial	-	Antenna System	1 KW RF output. With AN/URA-38, use connector type UG-982/U to mate with CU-938/URA-38 connector J2.

TABLE 2-2. CABLE TYPES AND TERMINATIONS (Cont)

NO.	FROM	MATING CONNECTOR	CABLE TYPE	MATING CONNECTOR	TO	REMARKS
W9	AM-3924(P)/URT J8	10-109618-1P	Multiconductor (MSCA type)	-	Accessories	See Table 2-8 for pin connections.
W10	T-827/URT J7	MS3106E-14S-2S	Multiconductor (TTHFWA Type)	-	FSK equipment	See Table 2-9 for pin connections.
W11	T-827/URT J5	MS3106E-10SL-4S	2 conductor (TTHFWA Type)	-	Optional Remote Equipment	Aux. balanced 600 ohm USB/AM/ISB input.
W12	T-827/URT J6	MS3106E-10SL-4S	2 conductor (TTHFWA Type)	-	Optional Remote Equipment	Aux. balanced 600 ohm LSB/ISB input.

TABLE 2-3. CABLE W2 TERMINATIONS

WIRE SIZE	FROM CONNECTOR TYPE 10-109628-21P	TO CONNECTOR TYPE MS3116J-22S-55S	REMARKS
22	PIN A	PIN A	RF AMPL TUR CONT NO. 1
↕	B	B	RF AMPL TUR CONT NO. 2
	C	C	RF AMPL TUR CONT NO. 3
	D	D	RF AMPL TUR CONT NO. 4
	E	E	RF AMPL TUR CONT NO. 5
22	G	G	CW/FSK GRD
	H	I	SHLD GRD R, S, U
22	J	J	INTLK +28V
↕	K	K	KEYLINE
	M	M	+28V STBY AND OPERATE
	N	N	+20V OPERATE
22	P	P	GRD PULSE
22 SHLD	R	R	115 VAC
22 SHLD	S	S	115 VAC COM
22	T	T	+20V CARR. REINSERT
22 SHLD	U	U	115 VAC REMOTE
22	V	V	-30 VDC
↕	Z	Z	COMMON GRD, SHLD, f, g, q or p, and r.
	a	CC	SPARE
	b	DD	SPARE
22	c	c	CW/FSK KEY
22 SHLD	d	d	APC
↕	e	e	PPC
	f	f	REMOTE 600 Ω LSB/ISB
22 SHLD	g	g	REMOTE 600 Ω LSB/ISB
	h	h	SHLD GRD d, e
22	j	j	TTY (-)
22	k	k	PTT +12V KEY
22	m	m	SPARE
22 SHLD	p	q	REMOTE 600 Ω USB/AM/ISB
22 SHLD	r	r	REMOTE 600 Ω USB/AM/ISB
22	s	BB	TTY (+)
22	X	s	EARPHONE AUDIO
22	PIN n	PIN H	12 V NEGATIVE

TABLE 2-4. CABLE W3 TERMINATIONS

WIRE SIZE	FROM CONNECTOR TYPE 10-109628-17P	TO CONNECTOR TYPE 10-109628-17S	REMARKS
14	PIN A	PIN A	Ø A
14	B	B	Ø B
14	C	C	Ø C
22	D	D	Ø B-T1 INPUT
↕	E	E	Ø A-T1 INPUT
	F	F	115 VAC 60 CPS COM
	G	G	115 VAC 60 CPS HOT
	H	H	+24 V SWITCHED
	J	J	+24 V HOT
	K	K	115 VAC INV 400 CPS HOT
	L	L	115 VAC INV 400 CPS COM
	M	M	+500 VDC
	N	N	COM GRD
22	P	P	PWR SUPPLY INTLK
18	PIN R	PIN R	+2250 VDC

TABLE 2-5. CABLE W4 TERMINATIONS

WIRE SIZE	FROM CONNECTOR TYPE 10-109620-19S	TO PRIMARY POWER SOURCE (4600 WATTS)	REMARKS
12	PIN A		PHASE A (19.8 AMP)
12	PIN B		PHASE B (19.8 AMP)
12	PIN C		PHASE C (19.8 AMP)

TABLE 2-6. CABLE W5 TERMINATIONS

WIRE SIZE	FROM CONNECTOR TYPE 10-109620-27P	TO CONNECTOR TYPE 10-109620-27S	REMARKS
22	PIN A	PIN A	COM GRD
↑	B	B	KEYLINE
	E	E	GRD PULSE
	F	F	TUNE PWR CONT
	G	G	SPARE
	H	H	SPARE
	I	I	SPARE
	J	J	KEY INTLK
↓	L	L	115 VAC
22	PIN M	PIN M	115 VAC COM

TABLE 2-7. CABLE W7 TERMINATIONS

WIRE SIZE	FROM CONNECTOR TYPE 10-109628-12P	TO TRANSMITTER SWITCHBOARD	REMARKS
22	PIN A		COM GRD
22	↑ B		12V POSITIVE
	C		SHLD GRD. T, U, V, W
22	D		115 VAC COM
↑	E		TTY (+)
	F		TTY (-)
	G		PTT +12V KEY
↓	H		115 VAC REMOTE
22	S		CW/FSK KEY
22 SHLD	T		REMOTE 600 Ω LSB/ISB INPUT
22 SHLD	U		REMOTE 600 Ω LSB/ISB INPUT
22 SHLD	V		REMOTE 600 Ω USB/AM/ISB INPUT
22 SHLD	W		REMOTE 600 Ω USB/AM/ISB INPUT
22	Z		12V NEGATIVE
↑	a		SPARE
	b		SPARE
↓	d		SPARE
22	PIN J		EARPHONE AUDIO

TABLE 2-8. CABLE W9 TERMINATIONS

WIRE SIZE	FROM CONNECTOR TYPE 10-109618-1P	TO ACCESSORY EQUIPMENT	REMARKS
22 ↕ 22	PIN A B C D E F G H I PIN J		COM GRD KEYLINE +28V RCVR MUTING KEYLINE INTLK GRD CW/FSK GRD SPARE SPARE SPARE SPARE SPARE

TABLE 2-9. CABLE W10 TERMINATIONS

WIRE SIZE	FROM CONNECTOR TYPE MS3106E-14S-2S	TO FSK EQUIPMENT	REMARKS
22 ↕ 22	PIN A B C PIN D		LOCAL FSK KEY INPUT LOCAL TTY INPUT (+) LOCAL TTY INPUT (-) COM GRD

Note

All shielded cables must have shielding integrally connected to the shell of the connector. All armored cables must have armor stripped back 10 inches.

2-25. INTERCONNECTION.

Note

If the AN/URA-38 is used with the AN/URT-23(V), the cable supplied as AN/URA-38 cable W1 will be used as AN/URT-23(V) cable W5.

2-26. Interconnection of the equipment is shown in figure 2-4. All connections are made at the rear of the units. The PP-3917/UR does not appear on the illustration since all of its connections are made within the AM-3924(P)/URT. Use copper ground strap (solid preferred) to connect the MT-3399/U to the nearest ground. The ground straps required to interconnect the units and the units and MT-3399/U are supplied as a part of the AN/URT-23(V).

CAUTION

Ensure good metal-to-metal bonding between units, and between the system and a ground.

2-27. INSPECTION AND ADJUSTMENT.

2-28. INSPECTION.

2-29. After the equipment has been installed, but before it is energized, a thorough inspection should be conducted to ensure that the AN/URT-23(V) is electrically and mechanically ready for operation. The following points should be checked. Replacement or repairs should be made if necessary.

a. Inspect each unit to ensure that all mounting hardware has been properly installed and tightened.

b. Ensure that the cable connections on the rear of the cases are correct, complete, properly seated, and tightened (figure 2-4).

c. Determine that the ground straps are properly installed (figure 2-4).

d. If the equipment is stack mounted, ensure that the shock mount and sway brace are properly secured and free to sway.

e. Inspect all front panel controls and indicators for mechanical damage, looseness, or improper mechanical action.

f. Loosen the captive front panel screws and open the case of each equipment. Inspect the interior for signs of damage.

g. Check all fuse holders to ensure that each contains a fuse of the proper rating.

h. CAREFULLY CHECK OUT THE PRIMARY POWER CONNECTIONS IN THE AN/URT-23(V) TO MAKE SURE THAT IT IS PROPERLY WIRED AND FUSED FOR THE INTENDED POWER SOURCE.

i. Loosen the six front panel captive screws and pull the T-827/URT chassis from the case. Check that switch S1 (COMP/INT/EXT) on top of the Frequency Standard Electronic Assembly is set at INT (or EXT if ship's frequency standard is used). Ensure that switch S7

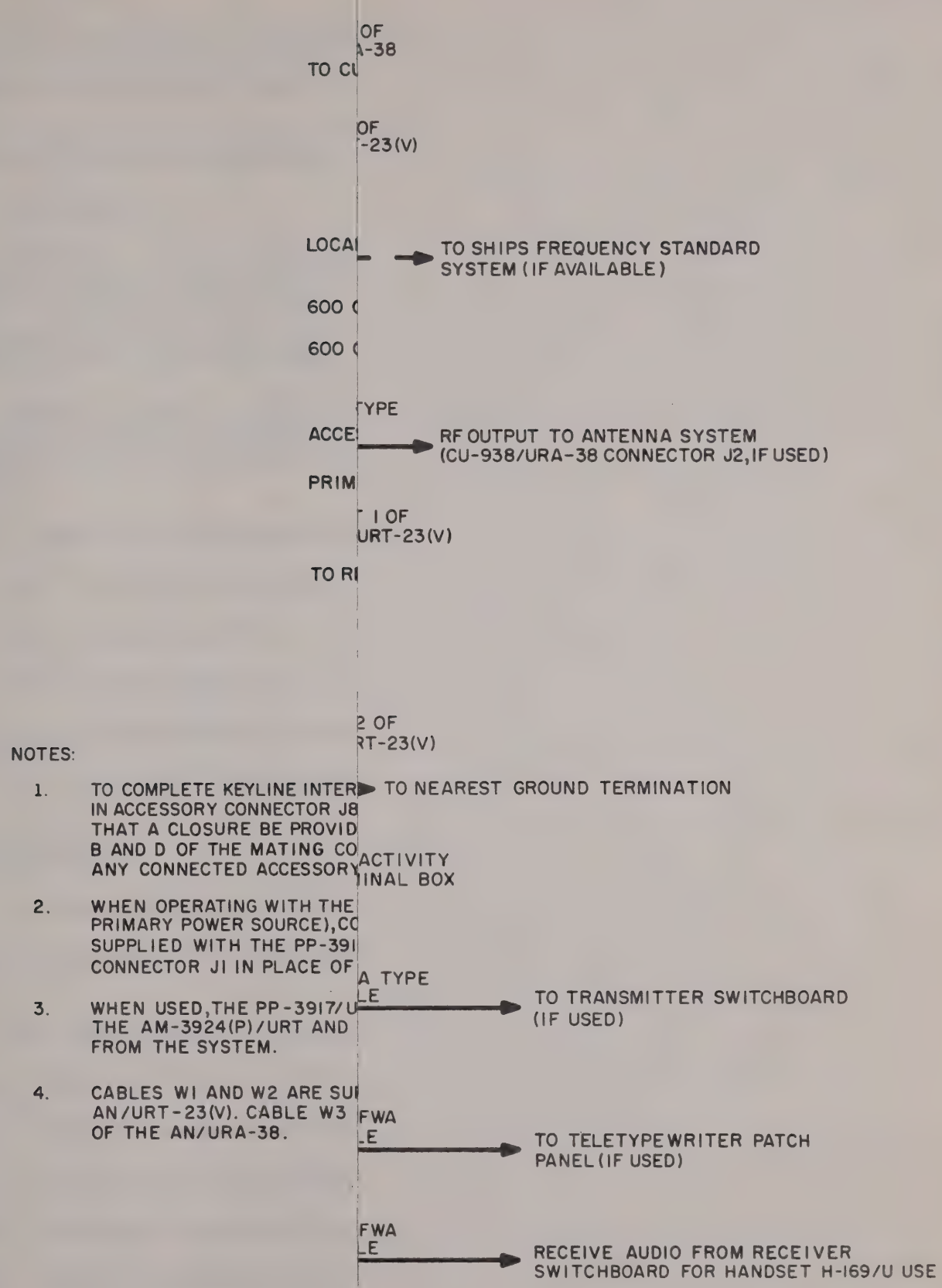
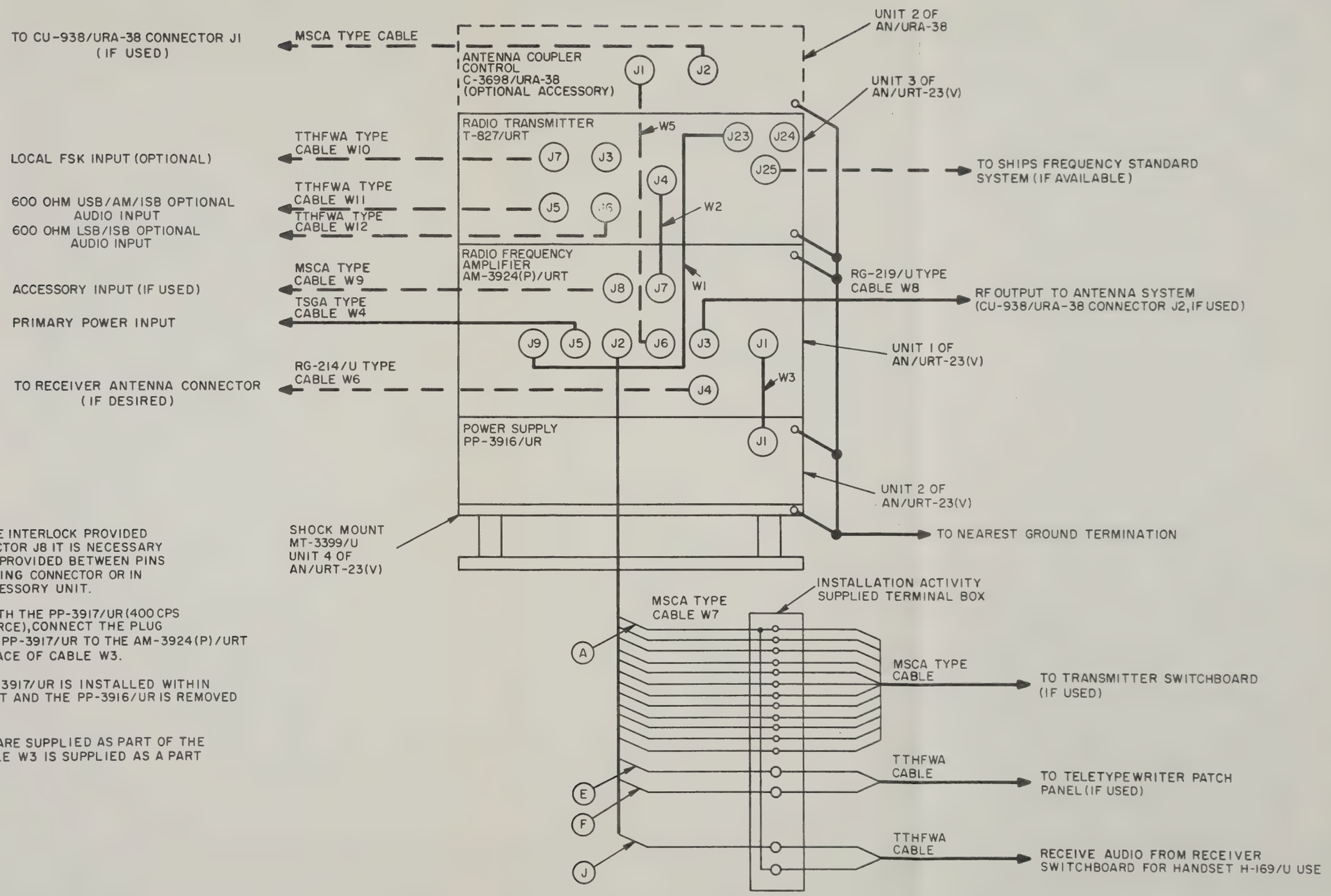


Figure 2-4. Interconnection Diagram



NOTES:

1. TO COMPLETE KEYLINE INTERLOCK PROVIDED IN ACCESSORY CONNECTOR J8 IT IS NECESSARY THAT A CLOSURE BE PROVIDED BETWEEN PINS B AND D OF THE MATING CONNECTOR OR IN ANY CONNECTED ACCESSORY UNIT.
2. WHEN OPERATING WITH THE PP-3917/UR (400 CPS PRIMARY POWER SOURCE), CONNECT THE PLUG SUPPLIED WITH THE PP-3917/UR TO THE AM-3924(P)/URT CONNECTOR J1 IN PLACE OF CABLE W3.
3. WHEN USED, THE PP-3917/UR IS INSTALLED WITHIN THE AM-3924(P)/URT AND THE PP-3916/UR IS REMOVED FROM THE SYSTEM.
4. CABLES W1 AND W2 ARE SUPPLIED AS PART OF THE AN/URT-23(V). CABLE W3 IS SUPPLIED AS A PART OF THE AN/URA-38.

Figure 2-4. Interconnection Diagram

(AUX/NORM) just behind the front panel on the left, is set at NORM. Set CTR FREQ switch on top of FSK tone generator module at 2000. Slide the chassis back into the case and tighten the six front panel captive screws.

j. If the AN/URA-38 is used, refer to NAVSHIPS 0967-204-0010 Section 2, and perform the required inspection procedures after installation.

2-30. ADJUSTMENT.

2-31. GENERAL. Variations in system gain over the operating frequency range require that the AM-3924(P)/URT and T-827/URT be adjusted the first time the two are operated together. In addition, the tune power output level must be adjusted if the AN/URT-23(V) is to be operated with an antenna coupler system other than the AN/URA-38. The following paragraphs provide all the information required to perform these adjustments.

2-32. KEYING FIXTURE FABRICATION. A small keying fixture is required during the installation adjustment procedures to enable the connection of a two-tone audio signal and keying at the T-827/URT HANDSET connector. To fabricate the keying fixture, proceed as follows:

a. Obtain the following material from stock supply:

(1) A small aluminum chassis.

(2) Two banana jacks.

(3) A SPST toggle switch.

(4) A MS3106A14S-6P connector.

(5) Four feet of four conductor cable.

b. Drill holes as required and mount the two banana jacks and the toggle switch to the aluminum chassis.

c. Attach the connector to one end of the four conductor cable.

d. Wire the other end of the cable to the banana jacks and toggle switch as shown in figure 2-5.

2-33. TEST EQUIPMENT. The test equipment required is as follows:

a. Electrical Dummy Load DA-242/U.

b. Electronic Multimeter AN/USM-116.

c. Two-Tone Audio Signal Generator SG-376/U.

d. Keying fixture fabricated in paragraph 2-32.

e. Electronic Multimeter ME-6D/U.

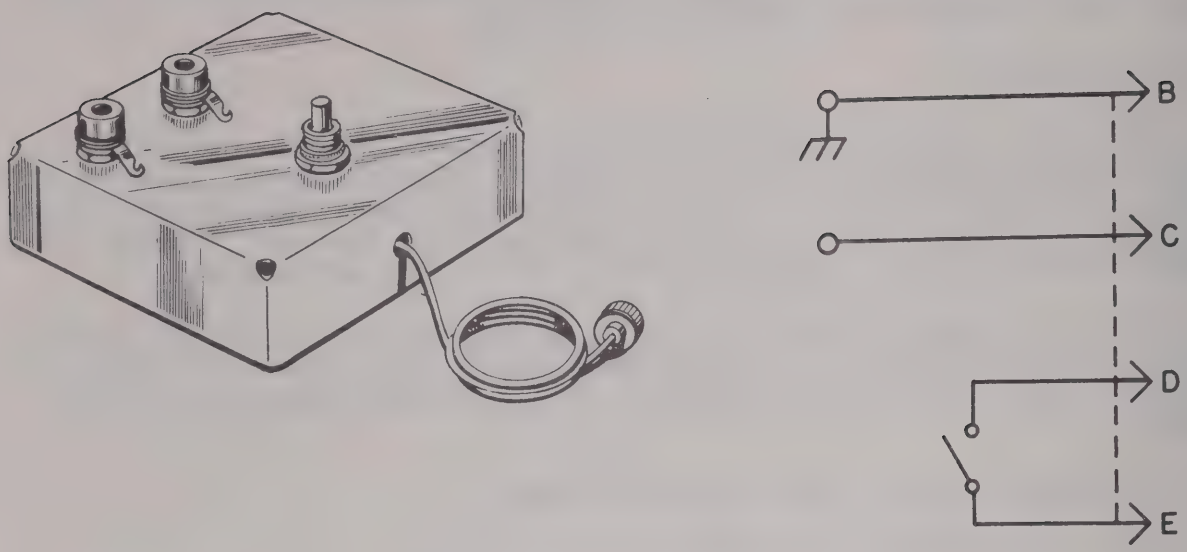


Figure 2-5. Keying Fixture Fabrication Details

2-34. SYSTEM ALIGNMENT. The following procedure must be performed whenever an AM-3924(P)/URT and T-827/URT are operated together for the first time or a repair has been made in the equipment.

WARNING

Be extremely careful when working with the AM-3924 (P)/URT chassis extended from the case. Voltages as high as 2250 volts DC and 2000 volts RF exist in this unit.

a. Connect all equipment as shown in figure 2-6. Turn all test equipment on.

b. Perform steps a through m of paragraph 3-31.

c. Loosen the AM-3924(P)/URT front panel captive screws and slide chassis out from case.

d. Set PPC ADJ R11 and APC ADJ R12 maximum CW.

e. Release chassis slide locks and slide AM-3924(P)/URT chassis back into case. Secure temporarily with one or two captive screws.

f. Set tone A of SG-376/U for an output of 1000 CPS at 0 volts. Set SG-376/U OUTPUT for tone A.

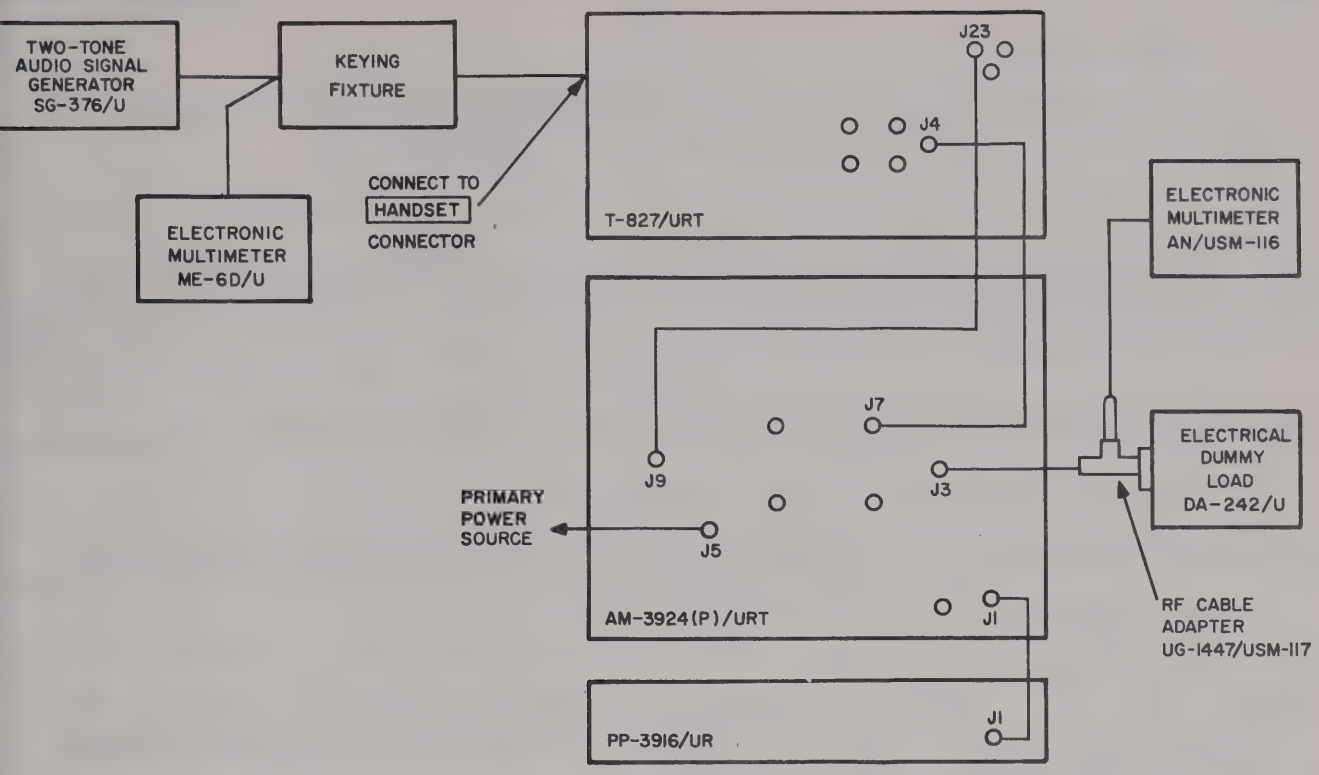


Figure 2-6. Preliminary Adjustments, Test Equipment Connection Diagram

g. Set T-827/URT for a frequency of 2.000 MC.

h. Key system with keying fixture.

i. Slowly increase level of SG-376/U output until AN/USM-116 indicates 50 volts, and note ME-6D/U indication.

j. Decrease SG-376/U output to 0 volts. Increase T-827/URT frequency by 1 MC and repeat step i.

k. Repeat step j for all MC positions of the T-827/URT controls. Note switch position which provides highest and lowest ME-6D/U indication.

l. Set T-827/URT MC controls at that frequency which provided highest ME-6D/U indication in step k. Repeat step j using 100 KC increments in place of 1 MC increments.

m. Set T-827/URT 100 KC control at that frequency which provided highest ME-6D/U indication in step 1. Repeat step j using 10 KC increments in place of 1 MC increments.

n. Set T-827/URT 10 KC control at that frequency which provided highest ME-6D/U indication in step m. Repeat step j using 1 KC increments in place of 1 MC increments. Note and record complete T-827/URT frequency setting which provides highest ME-6D/U indication, as determined in steps k, l, m and n.

o. Set T-827/URT MC controls at positions which provided lowest ME-6D/U indication in step k, and set all KC controls at zero.

p. Following the procedure outlined in steps i through m, determine complete T-827/URT frequency setting which provides lowest ME-6D/U indication.

q. Unkey system.

r. Set T-827/URT frequency controls at that frequency which provided highest ME-6D/U indication recorded in step n (channel with lowest gain).

s. Adjust SG-376/U to provide an indication of 44 MV on ME-6D/U.

t. Set SG-376/U tone B for an output of 1700 CPS at 44 MV. Set SG-376/U OUTPUT switch at AB (two-tone output). SG-376/U two-tone output should be 56 MV.

u. Loosen T-827/URT front panel captive screws and slide chassis out from case.

v. Defeat T-827/URT interlock switch by pulling plunger straight out.

w. Connect a CW Key to T-827/URT CW KEY input.

x. Rotate T-827/URT IF amplifier module A12 GAIN ADJ R15 fully clockwise.

y. Set T-827/URT Mode Selector switch at CW.

z. Key system with CW key.

aa. Adjust T-827/URT IF amplifier module A12 GAIN ADJ (R12) for an indication of 230 volts on AN/USM-116.

ab. Unkey system and set T-827/URT Mode Selector to USB.

ac. Set T-827/URT LSB Transmitter Audio Amplifier A3 and USB Transmitter Audio Amplifier A2 GAIN ADJ (R11) controls fully counterclockwise.

ad. Key system from test fixture.

ae. Adjust T-827/URT USB Transmitter Audio Amplifier A2 GAIN ADJ (R11) control for a meter reading of 230 volts on AN/USM-116.

af. Unkey system, and set T-827/URT Mode Selector switch at LSB.

ag. Key system from test fixture.

ah. Adjust T-827/URT LSB Transmitter Audio Amplifier A3 GAIN ADJ (R11) control for a meter reading of 230 volts on AN/USM-116.

ai. Unkey system, and disconnect SG-376/U from test fixture.

aj. Set T-827/URT Mode Selector switch at AM.

ak. Key system from test fixture.

al. Adjust T-827/URT Transmitter Mode Selector Module A1 % MOD control for an indication of 112 volts on AN/USM-116.

am. Unkey system, and set T-827/URT Mode Selector switch at FSK.

an. Set T-827/URT FSK Tone Generator Module A9 OUTPUT LEVEL control fully clockwise.

ao. Set AM-3924(P)/URT PWR control fully counterclockwise. At the rear of T-827/URT, jumper connector J7 pin A to pin D.

CAUTION

Make the following adjustment very carefully, to avoid exceeding the rated 1 KW output of the AM-3924(P)/URT.

ap. Key system from test fixture.

aq. Observe AN/USM-116, and carefully adjust AM-3924(P)/URT PWR control for an indication of 224 volts. If 224 volts cannot be obtained, set AM-3924(P)/URT PWR control fully clockwise and adjust T-827/URT Tone Generator Module A9 OUTPUT LEVEL Control for an indication of 224 volts on AN/USM-116.

ar. Unkey system and set T-827/URT Mode Selector switch to AM. Set AM-3924(P)/URT PWR control maximum CW.

as. Slide T-827/URT chassis into case, and secure with front panel screws.

at. Set T-827/URT Frequency Controls to that frequency which gave lowest audio input (lowest indication on ME-6D/U) in step p (channel with highest gain).

au. Loosen AM-3924(P)/URT front panel captive screws and slide chassis out from case.

av. Defeat two interlock switches by pulling plungers straight out. Allow five minutes for system to stabilize.

aw. Set AM-3924(P)/URT APC ADJ (R12) maximum counterclockwise.

ax. Set AM-3924(P)/URT PPC ADJ (R11) maximum clockwise.

ay. Key system from test fixture.

az. Increase APC ADJ (R12) until AN/USM-116 indicates 112 volts. Lock APC ADJ (R12).

ba. Unkey system.

bb. Set AM-3924(P)/URT PPC ADJ (R11) maximum counterclockwise.

bc. Reconnect SG-376/U to test fixture. Do not disturb output settings (56 MV for two-tone output as indicated on ME-6D/U).

bd. Key system from test fixture.

be. Increase PPC ADJ (R11) until AN/USM-116 indicates 230 volts. Lock PPC ADJ (R11).

bf. Unkey system.

bg. Set T-827/URT Mode Selector switch at LSB and key system from test fixture. The AN/USM-116 should indicate between 224 and 234 volts. If indication is not proper, adjust PPC ADJ (R11) for an indication of 230 volts on AN/USM-116.

bh. Unkey system, and lock PPC ADJ (R11).

CAUTION

Perform steps bi through bk carefully to ensure that the rated output of the AM-3924(P)/URT is not exceeded while determining that the PPC is properly adjusted for CW.

bi. Rotate AM-3924(P)/URT PWR control maximum counterclockwise.

bj. Set T-827/URT Mode Selector switch at CW.

bk. Key system with CW key, and carefully rotate AM-3924(P)/URT PWR control clockwise while observing AN/USM-116. If system is properly adjusted, AN/USM-116 should not exceed an indication of 224-234 volts when PWR control is set fully clockwise. If AN/USM-116 indication exceeds 234 volts before PWR control is adjusted fully clockwise, STOP, unkey system, set T-827/URT Mode Selector switch at AM, and repeat procedure from step ax on.

bl. Unkey system, and set T-827/URT frequency controls for 21.000 MC.

bm. Key system with CW key. The AN/USM-116 should indicate between 224 and 234 volts.

bn. With system still keyed, adjust AM-3924(P)/URT Meter Cal R14 for an indication in watts on the Power Meter, equivalent of AN/USM-116 voltage indication. (To convert voltage to watts, use formula Watts = $(\text{Voltage})^2/50$.
EXAMPLE: $224V^2/50 = 1003$ Watts.

bo. Unkey system and set T-827/URT Mode Selector switch at USB.

bp. Set AM-3924 (P)/URT Key switch at TUNE KEY, and observe that Power Meter indicates 200 $\pm$ 50 Watts. If Power Meter indication is not within prescribed limits perform procedures in paragraph 2-35.

bq. Set T-827/URT Mode Selector switch at OFF and AM-3924(P)/URT PRIMARY POWER switch at OFF.

br. Slide AM-3924(P)/URT into case and secure with front panel captive screws.

bs. Disconnect all test equipment.

bt. Reconnect system as shown in figure 2-4.

2-35. TUNE POWER ADJUSTMENT. The reduced tune power output from the AM-3924(P)/URT can be varied by changing the value of resistor R25 on APC-PPC assembly 1A1A6. The level of this output is set according to the requirements of the antenna coupler being used with the AN/URT-23(V). As shipped, the AM-3924(P)/URT tune power output is factory set to approximately 200 watts (for use with Antenna Coupler Group AN/URA-38). To adjust the tune power output level of the AM-3924(P)/URT, proceed as follows:

CAUTION

Reducing the value of resistor 1A1A6R25 increases the tune power output level of the AM-3924(P)/URT. If too small a value of resistor is used, the tune power output can exceed the 1 KW rated output of the AM-3924(P)/URT. The value of resistor 1A1A6R25 should never be less than 3.3 K ohms.

CAUTION

The APC and PPC adjustments will always have to be reset each time the tune power is changed.

a. If paragraph 2-34 has been performed previously, repeat steps a and b of that paragraph; otherwise, perform paragraph 2-34 in its entirety.

a. Perform steps a through bh of paragraph 2-34.

b. Disconnect SG-376/U.

c. Set the Key switch at TUNE KEY and observe the reading on the front panel Power neter.

d. Determine whether the indication in step c must be increased or decreased, to fall within the limits for tune power required by the antenna coupler to be used with the AN/URT-23(V).

Note

To decrease the tune power, increase the resistance of resistor 1A1A6R25.

e. Set the Key switch at NORMAL, and de-energize the AN/URT-23(V).

f. Locate and remove APC-PPC printed circuit board on the top left of the chassis figure 5-7).

g. Locate resistor 1A1A6R25 on two stand-off terminals on the board (figure 5-15).

h. Using the soldering technique explained in paragraph 5-26, remove and discard resistor 1A1A6R25.

Note

Due to circuit differences, and APC-PPC settings, the value of 1A1A6R25 will vary between equipments. For approximately 200 watts of tune power, 1A1A6R25 will be approximately 5K. For 50 watts, 1A1A6R25 will be 20 K to 30 K.

i. From stock, select a fixed composition 1/4 watt resistor with a value which will produce the desired tune power output. Carefully solder the resistor between the two stand-off terminals on board 1A1A6.

j. Replace APC-PPC assembly 1A1A6 in the AM-3924(P)/URT chassis.

k. Repeat steps b and e to determine if the tune power output is now within the required limits.

l. Repeat steps d through i until the desired tune power output is obtained.

m. Check the APC and PPC adjustments by performing steps as, at, and ay through bc of paragraph 2-34.

2-36. PERFORMANCE CHECKS.

2-37. To ensure correct installation, perform the procedures in Section 3 for all modes of operation prior to releasing the equipment to operating personnel.

2-38. INTERFERENCE REDUCTION.

2-39. To reduce the possibility of RF interference, the system should be operated with all units bolted securely in their cases. Cable shielding, and ground connections in all fabricated cables should be carefully inspected to ensure proper terminations. The complete bonding system should also receive careful attention during installation. In addition to assure a good ground for the antenna, the system must be installed close to an effective, permanent ground termination. All ground straps between equipments, and between the system and the ground termination should be as short as possible, and connections should be clean and tight to ensure good bonding.

2-40. MODIFICATIONS REQUIRED FOR USE OF SECOND EXCITER.

2-41. GENERAL.

2-42. The AN/URT-23(V) system is designed for operation with the T-827/URT as an exciter. However, with modification, the AM-3924(P)/URT allows a second exciter to be used for keying the system and as an RF source, while utilizing the T-827/URT as a frequency selector and source of standby and operate control signals for the AM-3924(P)/URT. The second exciter must have an otherwise unused keying switch or relay contact closure to ground, to key the AM-3924(P)/URT.

2-43. PARTS REQUIRED.

2-44. Table 2-10 lists the parts required to modify the AM-3924(P)/URT for exciter no. 2 operation.

2-45. MODIFICATION PROCEDURE.

2-46. To make the necessary changes to the AM-3924(P)/URT to permit use of a second exciter, follow the procedure below. The reference designators listed in table 2-10 and on figure 2-7 will be used for the new parts. Figure 2-7 is a partial schematic of the AM-3924(P)/URT showing the modifications required. Carefully solder all connections and cover exposed terminations with plastic tape or tubing. Use #22 AWG stranded wire, plastic insulated for 500 volts minimum for all wiring. During the installation, do not disturb or remove existing wiring and connections unless directed to do so.

WARNING

Primary power will be present at some chassis connections, and at the connections in the rear of the case, unless primary power is shut off at the system source.

a. De-energize and secure the system by shutting off the primary power at its source.

b. Loosen the front panel captive screws and slide the AM-3924(P)/URT chassis out from the case until the chassis slides lock.

c. Punch out the plug button in the front panel, next to the Power meter, and install lampholder 1A1XDS4 in the hole (figure 3-2).

d. Open the access door on the front panel. Punch out the plug button over the Key switch, and install toggle switch 1A1S2 in the hole.

TABLE 2-10. EXCITER NO. 2 MODIFICATION PARTS LIST

REF DESIG	DESCRIPTION
1A1DS4	LAMP, NEON: MIL type MS25252NE2D
1A1S2	SWITCH, TOGGLE: MIL type MS35059-22
1A1XDS4	LAMPHOLDER: MIL type LH74LC13CN
1A2C23	CAPACITOR, FIXED CERAMIC: MIL type CK70AW152M
1A2CR1	DIODE: MIL type 1N3611
1A2J10	CONNECTOR, COAXIAL: MIL type UG-909B/U
1A2K2	RELAY, DPDT: MFR, Hi-G Corp, Winsor Locks, Conn. (FMC 02289) P/N 2K1B126
1A2MP1	TERMINAL LUG: MFR, Vaco Products Co., Chicago, Ill. (FMC 79061) P/N 6401
P8	CONNECTOR (Mates with 1A2A1J8) MIL type MS3106A-18-1S with CLAMP, MS-3057-10A, or Bendix Corp, Scintilla Div, Santa Ana, Calif. (FMC 12143) P/N 10-109618-1P with CLAMP 10-36233-183.
P10	CONNECTOR (Mates with J10) MIL type UG-88E/U
--	CONNECTOR TO MATE WITH EXCITER NO. 2 RF OUTPUT TERMINATION.
--	CONNECTOR TO MATE WITH EXCITER NO. 2 KEYLINE AND GROUND RETURN TERMINATION
--	WIRE, #22 AWG, STRANDED, INSULATED (LENGTH ENOUGH TO REACH TWICE EXCITER NO. 2 KEYLINE TERMINATION TO AM-3924 (P)/URT CONNECTOR 1A2A1J8, PLUS APPROXIMATELY 15 FEET FOR CHASSIS WIRING).
--	WIRE, COAXIAL TYPE RG-223/U, OR RG-58/U (LENGTH ENOUGH TO REACH FROM EXCITER NO. 2 RF OUTPUT TERMINATION to AM-3924 (P)/URT CONNECTOR 1A2J10).
1A2CR2	DIODE: MIL type 1N3611 (Use 1A2A1CR2 which is removed when installing this modification).
--	INSULATED STANDOFF (2 each): MFR Sealectro Corp, Mamaroneck, N.Y. (FMC 98291), P/N ST-SM-ITUR-C4.

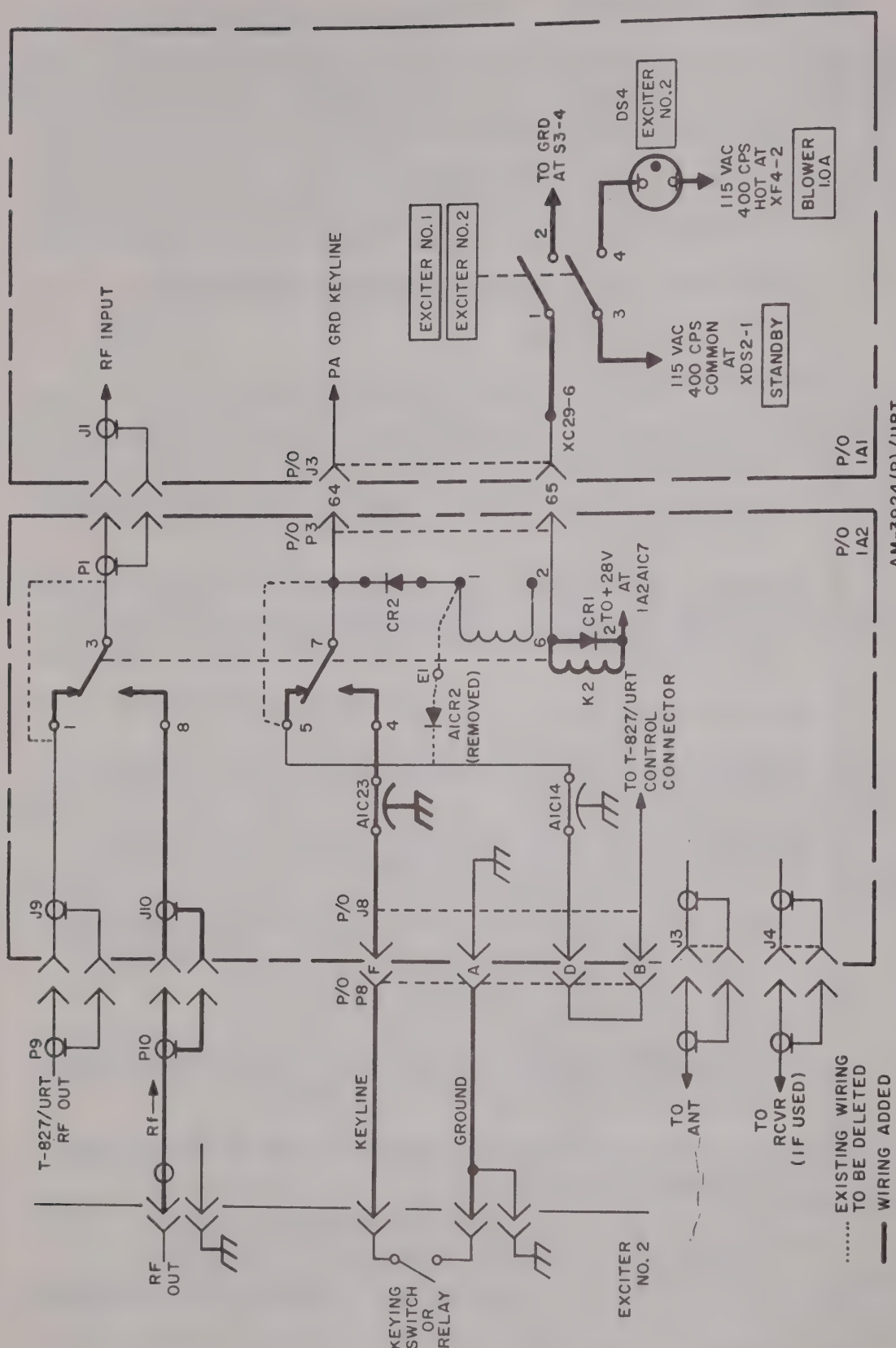


Figure 2-7. Exciter No. 2 Modifications, Schematic Diagram

e. Install indicator lamp 1A1DS4 in lampholder 1A1XDS4.

f. Solder a length of wire (approximately two feet) to terminal 6 of 1A1XC29, the socket for electrolytic capacitor 1A1C29. Dress the wire along the cable and through the hole behind the front panel to the underside of the chassis, to the newly installed switch 1A1S2. Cut and solder the wire to terminal 1 of 1A1S2.

g. Solder a length of wire (approximately 6 inches) to terminal 2 of 1A1S2. Dress the wire along the chassis cable to Key switch 1A1S3. Cut and solder the wire to terminal 4 (ground) of 1A1S3.

h. Solder a length of wire (approximately two feet) to terminal 3 of 1A1S2. Dress the wire along the chassis cable and through the hole behind the front panel, up to STANDBY lampholder 1A1XDS2. Cut and solder the wire to terminal 1 of 1A1XDS2 (in addition to the white-black-violet wire already there).

i. Solder a length of wire (approximately two feet) to terminal 4 of 1A1S2. Dress the wire along the chassis cable and through the hole behind the front panel, up to the newly installed lampholder 1A1XDS4. Cut and solder the wire to one terminal of 1A1XDS4.

j. Solder a length of wire (approximately two feet) to the unsoldered terminal of lampholder 1A1XDS4 (NOT the terminal used in step i). Dress the wire along the chassis cable to BLOWER fuse holder 1A1XF4. Cut and solder the wire to terminal 2 of 1A1XF4 in addition to the red wire already there.

k. This completes the modifications to the main chassis. Use lacing cord to spot tie the newly installed wires in place.

WARNING

The AM-3924(P)/URT chassis weighs approximately 125 pounds with the PP-3917/UR installed. Do not attempt to remove the chassis from the case without assistance.

CAUTION

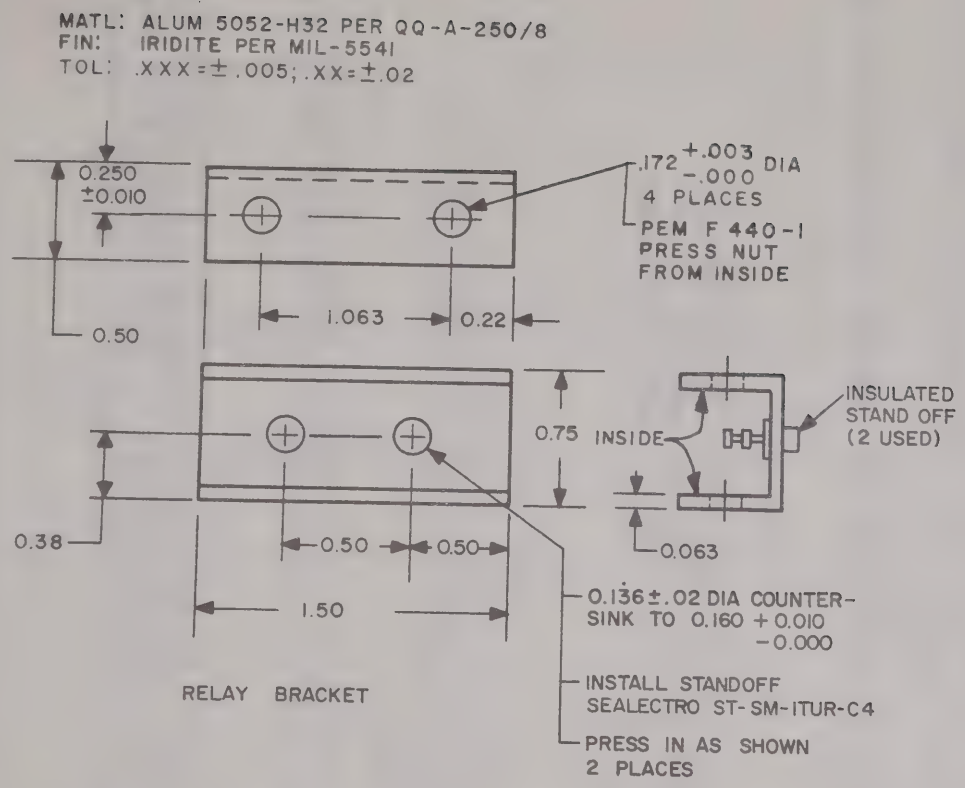
Disconnect 1A2P3 bracket before attempting to unscrew the connector jackscrews, to avoid shearing the connector pins.

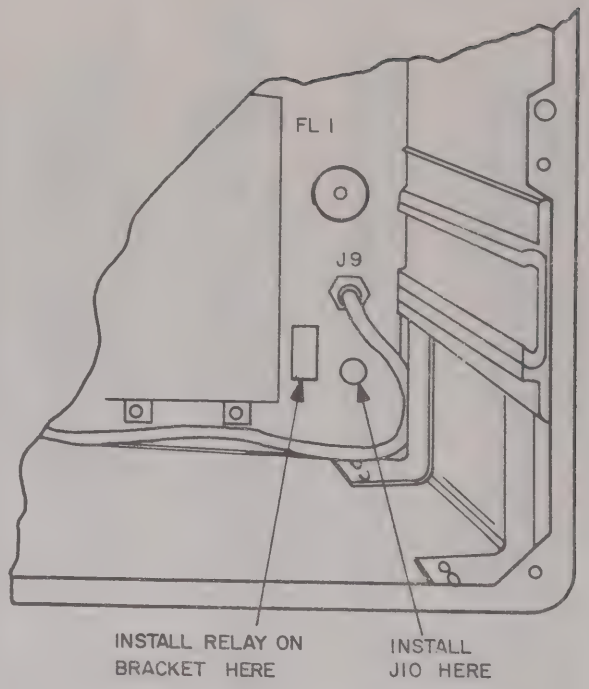
l. Disconnect the cables at the rear of the chassis. Release the chassis slide locks, and pull the chassis off from the slides. Set the chassis in a safe place while working on the case.

m. Fabricate a small bracket according to the instructions contained in figure 2-8, to mount relay 1A2K2 and 1A2CR2. Drill two holes in the rear of the case next to connector 1A2J9 for mounting the bracket, as shown in figure 2-8. Mount the relay to the bracket, installing the ground lug under one of the screws convenient to the relay terminals.

NOTE

To facilitate wiring, do not mount the bracket to the case at this time.





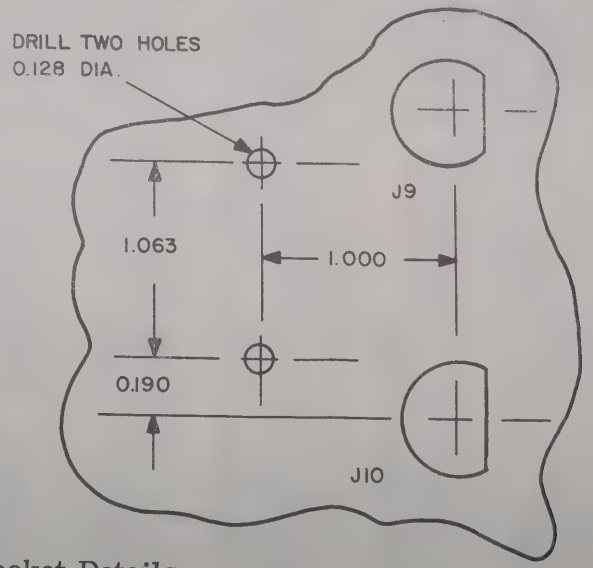


Figure 2-8. Exciter No. 2 Relay Bracket Details

n. Remove the cover from filter box 1A2A1 on the inside rear of the case.

o. Punch out the plug button on the top side of the filter box, and install capacitor 1A2A1C23.

p. Solder a length of wire (approximately 6 inches) to the terminal of 1A2A1C23 inside the filter box. Cut and solder the other end of the wire to pin F of 1A2A1J8 (Accessories connector).

q. Replace the cover on filter box 1A2A1.

r. Remove diode 1A2A1CR2 from between the end terminals of 1A2A1CR14 and 1A2A1E1. Install the diode on the insulated terminals on the new relay bracket.

NOTE

Hereinafter, diode 1A2A1CR2, which was removed from the filter box and installed on the relay bracket will be called 1A2CR2.

s. Cut the cable lacing on the cable to capacitors 1A2A1C1 through 1A2A1C14.

t. Unsolder the wire from 1A2A1C14. Dress the wire along the cable and solder to pin 7 of 1A2K2.

u. Solder a length of wire (approximately 1 foot) to 1A2A1C14. Dress the wire along the cable, cut to length, and solder to pin 5 of 1A2K2.

v. Solder a length of wire (approximately one and a half foot) to 1A2A1C23. Dress the wire along the cable, cut to length, and solder to pin 4 of relay 1A2K2.

w. Carefully extract the end of the white-black-brown wire (installed by manufacturer for use in this modification) from the cabling beneath the filter box. Dress the wire along the cable, cut to length, and connect (but do not solder) to terminal 6 of 1A2K2.

x. Unsolder the wire from 1A2A1E1. Dress the wire along the cable, cut to length, and solder to the anode of 1A2CR2 on the relay bracket.

y. Solder a short length of wire between the cathode of 1A2CR2 on the relay bracket, and pin 7 of relay 1A2K2.

z. Solder a length of wire (approximately one and a half feet) to the terminal of capacitor 1A2A1C7. Dress the wire along the cable and connect (but do not solder) to terminal 2 of relay 1A2K2.

aa. Carefully install diode 1A2CR1, cathode to pin 2, and anode to pin 6 of 1A2K2. Solder the connections on pins 2 and 6 of 1A2K2.

ab. Cut the coaxial cable from 1A2J9 to 1A2P1 at a point where the cut ends of the coaxial cable can be conveniently dressed and soldered to relay 1A2K2.

ac. Dress the two ends of the coaxial cable, and solder the shields to the solder lug previously installed under one of the relay mounting screws. If available, solder ferrules may be used to terminate the coaxial cable shields.

ad. Solder the center conductor of the coaxial cable from 1A2J9 to pin 1 of 1A2K2.

ae. Solder the center conductor of the coaxial cable from 1A2P1 to pin 3 of 1A2K2.

af. Install the UG-909B/U connector 1A2J10 on the end of a 6 inch length of coaxial cable (type RG-223/U or RG 58/U).

ag. Punch out the plug button in the rear of the case just beneath connector 1A2J9, and install connector 1A2J10 (with cable attached).

ah. Dress the coaxial cable from 1A2J10 to relay 1A2K2. Cut the cable to length, and dress and solder the cable shield to the solder lug next to the relay. Connect the cable center conductor to pin 8 of 1A2K2.

ai. Mount the bracket containing relay 1A2K2 to the rear wall of the case.

aj. Dress all cables so that nothing protrudes in front of the line filter (1A2FL1) and spot tie with lacing cord.

ak. Replace the chassis on the chassis slides and carefully connect the chassis cables.

al. Push the chassis back into the case, and tighten the front panel captive screws to secure.

am. Using stencils or paint, mark the AM-3924 (P)/URT front panel next to the newly installed components. Mark 1A1DS4 as EXCITER NO. 2. Mark 1A1S2 switch open position as EXCITER NO. 1, and switch closed position as EXCITER NO. 2.

an. Refer to paragraph 2-47 for external cable modifications required.

2-47. SYSTEM CABLE MODIFICATIONS.

2-48. After the AM-3924(P)/URT has been modified for use with exciter no. 2, modify the system cabling as follows:

a. Obtain cable connectors which will mate with the RF output, and keyline and keyline return (ground) connections of exciter no. 2.

b. Fabricate a coaxial cable which will reach from the RF output of exciter no. 2 to AM-3924(P)/URT connector 1A2J10. Use RG-223/U or RG-58/U cable, and install a UG-88E/U connector to mate with 1A2J10, and the appropriate connector to mate with exciter no. 2 RF output at the other end.

c. Fabricate a two wire cable using #22 AWG stranded insulated wire, for the keyline and ground connections. For the termination at AM-3924(P)/URT, use one of the types of connectors listed for plug P8 (to mate with connector 1A2J8). On P8, wire the keyline to pin F and the ground termination to pin A. Then use a short length of buss wire to short terminal D to terminal B on the connector (figure 2-7). Refer to the exciter no. 2 technical manual for cable terminations at that end.

d. Install the fabricated cables.

2-49. MANUAL CORRECTIONS.

2-50. After the modification for using exciter no. 2 is complete, make the following changes to this manual, to ensure correct operation by all personnel.

a. Correct figures 2-4, 5-23, and 5-26 to show the wiring changes made during the modification (use figure 2-7 as a guide).

b. Add the repair parts listed in table 2-10 to the parts list in Section 6.

c. Add a note stating "See paragraph 2-51 for information relating to operation of units with EXCITER NO. 2 modification" after the following:

(1) Paragraph 3-4 title.

(2) Paragraph 3-30 title.

(3) Paragraph 3-28 title.

(4) Paragraph 3-30 title.

(5) Paragraph 3-32 title.

(6) Paragraph 3-38 title.

d. In table 3-4 (Preliminary Settings), under AM-3924(P)/URT, add: EXCITER NO. 1 - EXCITER NO. 2 switch---EXCITER NO. 1 position.

e. In table 3-5 (Common Symptoms of System Malfunction) add: "System will not key--EXCITER NO. 1 - EXCITER NO. 2 switch in wrong position".

2-51. OPERATION USING EXCITER NO. 2.

2-52. The functions performed by exciter no. 2, when used with the AN/URT-23(V), are limited to controlling keying, and supplying an RF input to the AM-3924(P)/URT. Equipment turn on, standby/operate, and operate signals, and AM-3924(P)/URT frequency selection will still be controlled by the T-827/URT.

2-53. EQUIPMENT TURN-ON. To turn on the equipment and prepare it for operation using exciter no. 2, proceed as follows:

a. Energize the equipment and set up for operation in the LSB mode, using exciter no. 1 (T-827/URT) and the procedures described in paragraph 3-30.

b. Refer to the technical manual for exciter no. 2, and energize and set up exciter no. 2 for operation in the desired mode.

c. Proceed to paragraph 2-54 to tune the system.

2-54. TUNING. To tune the system, proceed as follows:

a. Set the AM-3924(P)/URT EXCITER NO. 1 - EXCITER NO. 2 switch at EXCITER NO. 1.

b. Set up the AN/URT-23(V) in the normal manner for the desired operating frequency, using the desired procedure under paragraph 3-32.

c. Unkey the AN/URT-23(V).

d. Set up exciter no. 2 for the desired operating frequency, in the desired mode of operation.

CAUTION

The PPC circuits within the AM-3924(P)/URT are designed for limiting RF output to provide circuit protection. For more efficient operation, initially key exciter no. 2 at reduced power, then adjust exciter no. 2 for 1 KW output from the AM-3924(P)/URT.

e. Reduce the RF output of exciter no. 2 to minimum.

f. Set the EXCITER No. 1 - EXCITER NO. 2 switch at EXCITER NO. 2

g. Key the AN/URT-23(V) from exciter no. 2, and adjust exciter no. 2 RF output for 1 KW RF output from the AM-3924(P)/URT.

2-55. OPERATION. To operate the AN/URT-23(V) using exciter no. 2, first perform the turn on and tuning procedures according to paragraphs 2-53 and 2-54 above, then proceed with operation in the desired mode, keying the system from the exciter no. 2. To change frequency, repeat paragraph 2-54 at the new frequency.

SECTION 3

OPERATION

3-1. FUNCTIONAL OPERATION.

3-2. GENERAL.

3-3. The AN/URT-23(V) is a 1 KW single-sideband Radio Transmitting Set capable of general purpose voice, CW, and FSK transmissions on any one of up to 280,000 channels in the 2.0 to 30.0 MC frequency range. The exact spacing and number of operating channels available depends on the model of T-827/URT delivered with the AN/URT-23(V). In surface ship and shore installations, Antenna Coupler Group AN/URA-38 is normally used with the AN/URT-23(V) to automatically match the impedance of the system antenna to the 50-ohm transmission line. However, provisions are included to allow operation with any 50-ohm antenna coupling system. The following paragraphs describe the sequence of operation for any system configuration in which the AN/URT-23(V) may be installed.

3-4. AUTOMATIC OPERATION WITH ANTENNA COUPLER GROUP AN/URA-38.

3-5. TURN-ON. Turning on the AM-3924(P)/URT PRIMARY POWER switch applies primary power to the PP-3916/UR (or PP-3917/UR). The power supply converts this input to 115 volt single phase power for the T-827/URT and AN/URA-38.

3-6. Setting the T-827/URT Mode Selector switch at STD BY energizes the T-827/URT power supply as well as a standby relay in the AM-3924(P)/URT. This energizes the internal power supplies, applying DC operating voltages to the control and protective circuits, and filament voltages to the electron tubes. Also, the energized standby relay connects 115 volts, 400 CPS, single phase power to the blower and indicator lamps, causing the STANDBY indicator to light. (An inverter circuit supplies the 115 volts, 400 CPS when the PP-3916/UR is used.) A time delay in the AM-3924(P)/URT forces the system to remain in this condition for three minutes regardless of any further actions at the T-827/URT, to allow the filaments of the electron tubes sufficient time to warm up.

3-7. Advancing the T-827/URT Mode Selector switch beyond STD BY energizes the AM-3924(P)/URT operate relay to connect three phase primary power to the high voltage power supplies in the PP-3916/UR (or PP-3917/UR) to produce the 2250 and 500 VDC required to power the electron tubes in the AM-3924(P)/URT. Also the STANDBY indicator is extinguished and the OPERATE indicator is tuned on, indicating that the AM-3924(P)/URT is now fully energized and ready for operation.

3-8. INITIAL SET-UP. The screen, bias, and plate voltages of the electron tubes are checked prior to keying the system by switching the Multipurpose meter switch through its various positions. If these voltages are correct, the system is keyed (without modulation) and the plate currents are checked. Final amplifier plate currents are adjusted with the front panel PA BIAS control. Maintenance procedures are required if any of the other parameters need adjustment.

3-9. TUNING. Setting the frequency selector controls on the T-827/URT front panel automatically tunes all required circuits in both the T-827/URT and the AM-3924(P)/URT. (The AM-3924(P)/URT FREQUENCY MC switch must be set at AUTOMATIC.) Turning on the

C-3698/URA-38 POWER switch causes the tuning elements in the CU-938/URA-38 to go to home (a predetermined position from which the tuning cycle is started.) Momentarily keying the system initiates the automatic tuning cycle, during which the AN/URA-38 automatically holds the system keyed and causes the AN/URT-23(V) to produce a 200 watt CW signal on which to tune. When the cycle is completed, the READY lamp on the C-3698/URA-38 front panel will light, and control of the system is returned to the T-827/URT. The entire system is now tuned and ready for full power transmissions.

3-10. OPERATION. The desired mode of operation is selected at the T-827/URT Mode Selector switch. The system then can be keyed and transmissions made as desired. The AN/URA-38 will automatically fine-tune as required to compensate for variations in antenna impedance, thus maintaining the required load for the AM-3924(P)/URT. Automatic average and peak power control signals produced by the AM-3924(P)/URT control the T-827/URT output to maintain the RF power output at a constant 1 KW PEP (lower if front panel PWR control has been adjusted.) Forward and reflected power on the transmission line can be measured or monitored with the Power meter and Power meter switch. If any of the power supplies become overloaded, its indicating-type fuse will open and indicate the fault. Overload detectors in the AM-3924(P)/URT and AN/URA-38 unkey the system when other faults occur, and provide audible and visual indication of the overload condition. (The audible alarms can be disabled.) If a frequency change involving the 10 MCS, 1 MCS, or 100 KCS controls on the T-827/URT is made during operation, the AN/URA-38 will automatically home and halt until the system is momentarily keyed. The AN/URA-38 will then retune for the new operating frequency as previously explained in paragraph 3-9.

3-11. SILENT OPERATION WITH ANTENNA COUPLER GROUP AN/URA-38.

3-12. Silent operation (tuning without RF power) is identical to the procedures explained in paragraphs 3-5 through 3-10, with the exception of tuning. The AN/URA-38 is tuned in a silent mode using the LEFT and RIGHT pushbuttons, ELEMENT POSITION meter, and L-C switch on the C-3698/URA-38 front panel as explained in NAVSHIPS 0967-204-0010. Full power transmissions then can be keyed as required. In the silent mode, the AN/URA-38 will automatically fine tune as required during the transmission the same as was done in automatic operation.

3-13. MANUAL OPERATION WITH ANTENNA COUPLER GROUP AN/URA-38.

3-14. Manual operation is identical to the procedures explained in paragraphs 3-5 through 3-10, with the exception of tuning. The system is keyed by holding the AM-3924(P)/URT Key switch at TUNE KEY, and the AN/URA-38 is tuned using the LEFT and RIGHT pushbuttons. L-C switch and DISCRIMINATOR NULL meter on the C-3698/URA-38 front panel as explained in NAVSHIPS 0967-204-0010. Full power transmissions then can be keyed as required. However, in this mode of operation, there is no automatic fine-tuning of the AN/URA-38 during transmission.

3-15. OPERATION WITH ANY 50 OHM ANTENNA SYSTEM.

3-16. Operation with a 50 ohm antenna system other than the AN/URA-38 is the same as explained in paragraphs 3-5 through 3-10, with the exception of tuning. After the operating frequency is selected at the T-827/URT, the system is keyed by holding the Key switch at TUNE KEY. (As shipped, the AN/URT-23(V) is set for a 200 watt output for tuning. If a lower output is required, a resistance value in the AM-3924(P)/URT can be changed to provide the necessary level of tune power (Section 2).) The antenna system is then adjusted as required (refer to the technical manual for the equipment being used). If required, the REFLECTED PWR positions of the Power meter switch and the Power meter can be used to tune the antenna coupler for minimum reflected power.

3-17. DESCRIPTION OF OPERATING CONTROLS AND INDICATORS.

3-18. RADIO TRANSMITTER T-827/URT.

3-19. All controls and indicators required for operation of the T-827/URT are located on the front panel (figure 3-1). Table 3-1 lists each operator control and indicator and its function.

3-20. RADIO FREQUENCY AMPLIFIER AM-3924(P)/URT.

3-21. All controls and indicators required for normal operation of the AM-3924(P)/URT are located on the front panel (figure 3-2). Those controls used for initial setup are located under the hinged door located in the lower center of the front panel. Table 3-2 lists each operating control and indicator and its function.

3-22. POWER SUPPLY PP-3916/UR.

3-23. There are no operating controls located on the PP-3916/UR front panel. Only two indicating type fuses and an indicator lamp are provided. The two fuses (28V SLOW-BLO and 500V 1.5A) protect their respective circuits against overload. In either case, the indicator in the fuse holder lights when the fuse opens. The POWER ON indicator lights to indicate that the PP-3916/UR inverter has been energized. (This provides 115 VAC, 400 CPS, single phase power for the AM-3924(P)/URT blower and indicator lamps.)

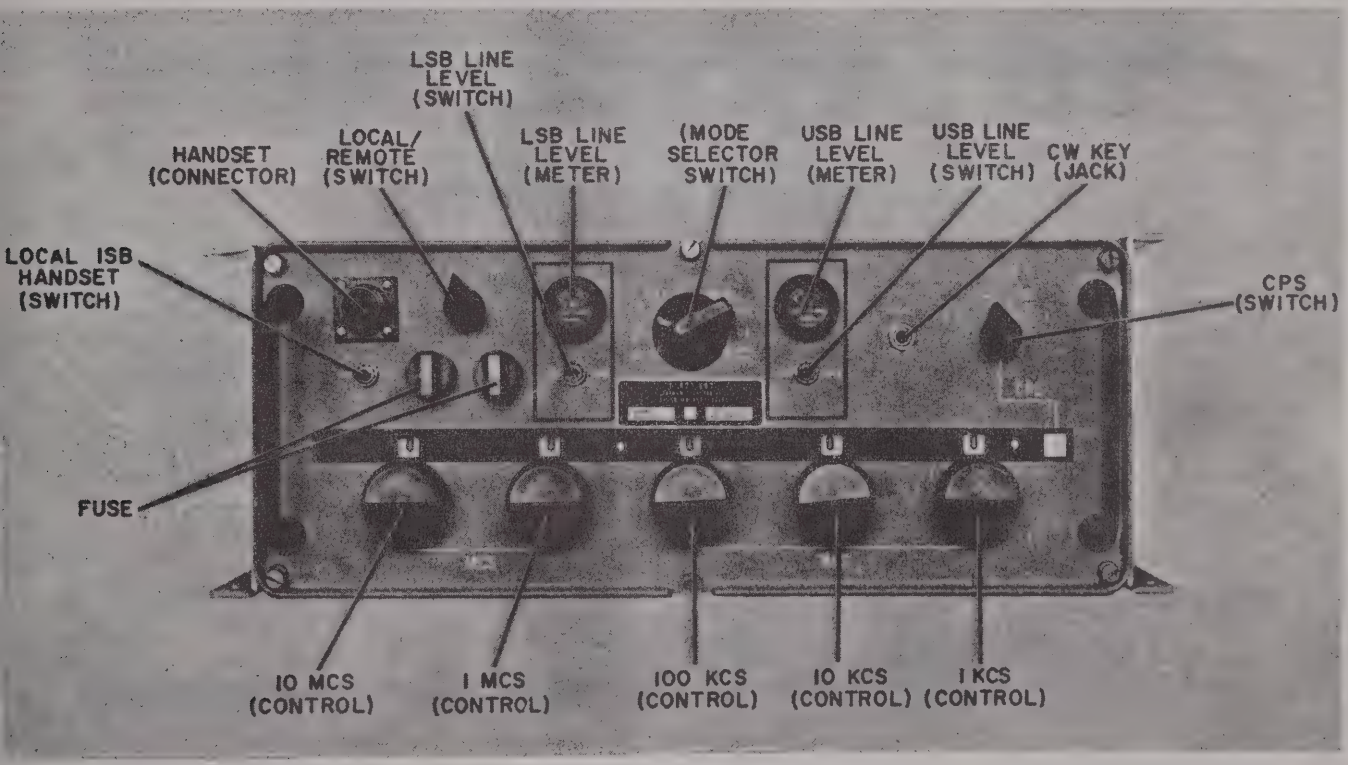


Figure 3-1. Radio Transmitter T-827/URT, Operating Controls, Indicators, and Connectors

TABLE 3-1. RADIO TRANSMITTER T-827/URT, OPERATING CONTROLS, INDICATORS, AND CONNECTORS

CONTROL/INDICATOR/ CONNECTOR	FUNCTION
LOCAL ISB HANDSET switch	Selects either USB or LSB handset audio input and output when Mode Selector is at ISB. Switch Position — Equipment Response LSB — Connects handset microphone and earphone to LSB channel. USB — Connects handset microphone and earphone to USB channel.
HANDSET connector	Used to connect handset to T-827/URT.
FUSE (with indicator)	Protects T-827/URT against overload; indicator glows when fuse is open.
FUSE (with indicator)	Protects T-827/URT against overload; indicator glows when fuse is open.
LOCAL-REMOTE switch	Selects local or remote key and input to T-827/URT. Switch Position — Equipment Response LOCAL — T-827/URT keying and input accomplished locally by operator. REMOTE — T-827/URT keying and input accomplished from a remote location.
LSB LINE LEVEL switch	Selects range for LSB LINE LEVEL meter. Switch Position — Equipment Response -10 DB — 10 DB has to be subtracted from LSB LINE LEVEL meter indication. +10 DB — 10 DB has to be added to LSB LINE LEVEL meter indication.

TABLE 3-1. RADIO TRANSMITTER T-827/URT, OPERATING CONTROLS, INDICATORS, AND CONNECTORS (Cont)

CONTROL/INDICATOR/ CONNECTOR	FUNCTION
LSB LINE LEVEL meter	Indicates LSB audio input line level.
Mode Selector switch	Selects T-827/URT mode of operation.
	Switch Position — Equipment Response
	OFF — No power is applied.
	STD BY — Energizes frequency standard and tube filaments.
	LSB — T-827/URT operates in LSB mode.
	FSK — T-827/URT operates in FSK mode.
	AM — T-827/URT operates in compatible AM mode (USB modulation plus carrier).
	CW — T-827/URT operates in CW mode. Transmitted frequency is at front panel frequency setting.
	USB — T-827/URT operates in USB mode.
	ISB — T-827/URT operates in ISB mode. Simultaneous transmission on LSB and USB during remote operation. Transmission on either LSB or USB during local operation.
	ISB/FSK — T-827/URT operates in ISB/FSK mode. Simultaneous transmission of voice on LSB and FSK on USB.
USB LINE LEVEL switch	Selects range of USB LINE LEVEL meter.
	Switch Position — Equipment Response
	-10 DB — 10 DB has to be subtracted from USB LINE LEVEL meter indication.

TABLE 3-1. RADIO TRANSMITTER T-827/URT, OPERATING CONTROLS, INDICATORS, AND CONNECTORS (Cont)

CONTROL/INDICATOR/ CONNECTOR	FUNCTION
USB LINE LEVEL switch (cont)	Switch Position: +10 DB — Equipment Response: 10 DB has to be added to USB LINE LEVEL meter indication.
USB LINE LEVEL meter	Indicates USB audio input line level.
KEY jack	Used to connect local CW handkey to T-827/URT.
CPS switch	Increases T-827/URT tuning capabilities. Switch Position: 000 — Equipment Response: T-827/URT is tuned to frequency indicated by MCS and KCS digit indicators. Switch Position: 500 — Equipment Response: T-827/URT is tuned 500 CPS above frequency indicated by MCS and KCS digit indicators.
10 MCS control	Selects 10 MC digit of desired operating frequency; digit selected will be displayed in window above control.
1 MCS control	Selects 1 MC digit of desired operating frequency; digit selected will be displayed in window above control.
100 KCS control	Selects 100 KC digit of desired operating frequency; digit selected will be displayed in window above control.
10 KCS control	Selects 10 KC digit of desired operating frequency; digit selected will be displayed in window above control.
1 KCS control	Selects 1 KC digit of desired operating frequency; digit selected will be displayed in window above control.

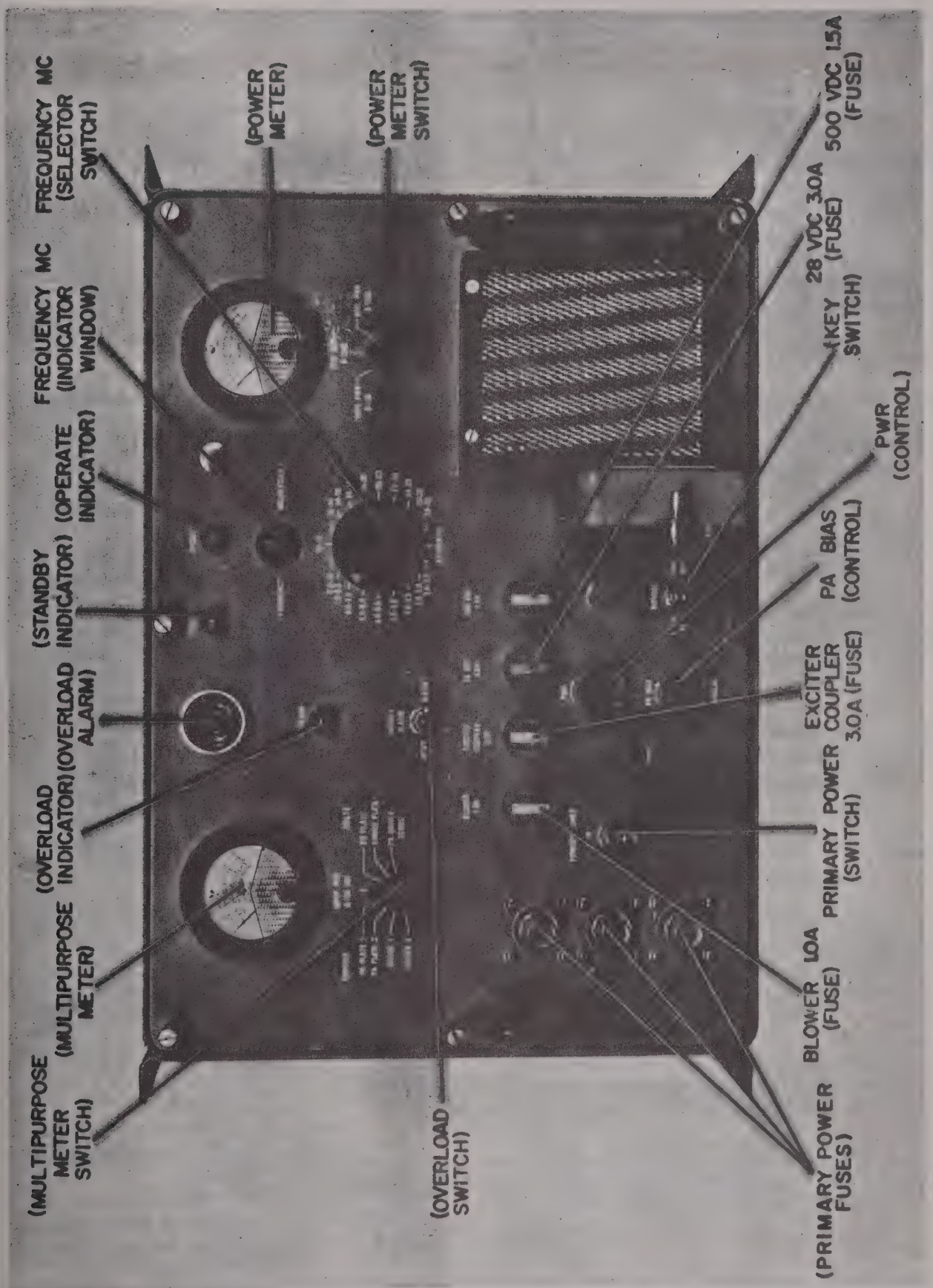


Figure 3-2. Radio Frequency Amplifier AM-3924(P)/URT, Operating Controls and Indicators

TABLE 3-2. RADIO FREQUENCY AMPLIFIER AM-3924(P)/URT, OPERATING CONTROLS AND INDICATORS

CONTROL/INDICATOR	FUNCTION
Multipurpose meter	Provides indications of the final and driver amplifier parameters as selected with the Multipurpose meter switch.
Multipurpose meter switch	Selects the final and driver amplifier parameters to be monitored with the Multipurpose meter. The parameters selected are:

Switch Position	Equipment Response
DRIVER 2 AMPERES	Multipurpose meter indicates cathode current of driver amplifier tube V2.
DRIVER 1 AMPERES	Multipurpose meter indicates cathode current of driver amplifier tube V1.
PA PLATE 2 AMPERES	Multipurpose meter indicates cathode current of final amplifier tube V2.
PA PLATE 1 AMPERES	Multipurpose meter indicates cathode current of final amplifier tube V1.
INPUT PWR 0-150 MW	RF level applied to input of driver amplifier by exciter is connected to Multipurpose meter.
PA PLATE VOLTS	DC voltage applied to plates of final amplifier tubes V1 and V2 is connected to Multipurpose meter.
DRIVER PLATE VOLTS	DC voltage applied to plates of driver amplifier tubes V1 and V2 is connected to Multipurpose meter.

TABLE 3-2. RADIO FREQUENCY AMPLIFIER AM-3924(P)/URT, OPERATING CONTROLS AND INDICATORS (Cont)

CONTROL/INDICATOR	FUNCTION
Multipurpose meter switch (cont)	Switch Position: PA-DRIVER SCRNS VOLTS — Equipment Response: DC voltage applied to screen grids of final amplifier tubes V1 and V2 and driver amplifier tubes V1 and V2 is connected to Multipurpose meter.
Overload alarm	Provides an audible indication when an overload occurs. The alarm can be disabled by setting the Overload alarm switch at DISABLE ALARM.
Power meter	Provides an indication of forward or reflected output power in the ranges selected with the Power meter switch.
Power meter switch	Selects range of forward or reflected power to be monitored with Power meter.
Primary power fuses (three used, with indicators)	Provides overload protection to each phase of the primary power input. If the fuse in any phase opens, the associated indicator will light.
BLOWER 1.0 A fuse (with indicator)	Protects the blower against overload; indicator lights if fuse opens.
EXCITER COUPLER 3.0 A fuse (with indicator	Protects the 115 volt single phase primary power output to the T-827/URT and AN/URA-38 (if used) from overload; indicator lights when fuse opens.
500 VDC 1.5 A fuse (with indicator)	Protects the 500 VDC supply from overload within the AM-3924(P)/URT; indicator lights if fuse opens.
PRIMARY POWER switch	When set at ON, primary power is supplied to AM-3924(P)/URT, T-827/URT, and AN/URA-38 (if used).

TABLE 3-2. RADIO FREQUENCY AMPLIFIER AM-3924(P)/URT, OPERATING CONTROLS AND INDICATORS (Cont)

CONTROL/INDICATOR	FUNCTION
PWR control	Enables RF power output to be varied without disturbing APC and PPC adjustments. Normally set maximum CW.
PA BIAS control	Enables bias voltage to final amplifier tubes V1 and V2 to be adjusted.
OVERLOAD indicator	Lights to provide a visual indication when an overload occurs.
Overload switch	Determines condition of overload circuits. Switch Position — Equipment Response ALARM — Overload alarm is enabled. DISABLE ALARM — Overload alarm is disabled. RESET (spring-loaded) — Overload circuit is reset.
STANDBY indicator lamp	Lights when AM-3924(P)/URT is in a standby condition.
OPERATE indicator lamp	Lights when AM-3924(P)/URT is ready to transmit.
FREQUENCY MC selector switch	When set at AUTOMATIC, a five wire code from the T-827/URT is used to automatically tune the AM-3924(P)/URT to the selected band. When set at any one of the other nineteen positions, a five wire code is internally generated to automatically tune the AM-3924(P)/URT to the selected band.
FREQUENCY MC indicator window	Indicates band to which the AM-3924 (P)/URT is tuned.
Key switch	Determines method by which AM-3924 (P)/URT is keyed.

TABLE 3-2. RADIO FREQUENCY AMPLIFIER AM-3924(P)/URT, OPERATING CONTROLS AND INDICATORS (Cont)

CONTROL/INDICATOR	FUNCTION	
Key switch (cont)	Switch Position	Equipment Response
	NORMAL	Keying of AM-3924(P)/URT is accomplished from T-827/URT or AN/URA-38.
	TUNE KEY	AM-3924(P)/URT and T-827/URT are keyed to produce a low power carrier for tuning purposes
	LOCAL KEY	AM-3924(P)/URT and T-827/URT are keyed for a normal power output.

3-24. POWER SUPPLY PP-3917/UR.

3-25. The PP-3917/UR is an optional subassembly for 400 CPS primary power operation of the AM-3924(P)/URT, and is completely enclosed when the AM-3924(P)/URT is in its case. Therefore, there are no operating controls or indicators for the PP-3917/UR.

3-26. ANTENNA COUPLER GROUP AN/URA-38.

3-27. All controls and indicators required for the operation of the AN/URA-38 are located on the C-3698/URA-38 front panel (figure 3-3). Table 3-3 lists each operator control and indicator and its function.

3-28. OPERATING PROCEDURES.

3-29. The operating procedures listed below provide the required information to operate the AN/URT-23(V) with the AN/URA-38 or any other antenna coupler. In all cases, the procedures are identical with the exception of the method of tuning. When using an antenna coupler other than the AN/URA-38, supplement the tuning procedures below with the operating instructions in the manual for that equipment. The initial set-up procedures need be performed only when the equipment is energized the first time during any given operating period.

CAUTION

When operating the AN/URT-23(V) the first time after installation or maintenance, determine that the system alignment procedure (paragraph 2-34) has been performed. If an abnormal indication is observed during the procedure, refer to paragraph 3-49 before proceeding to the next step.

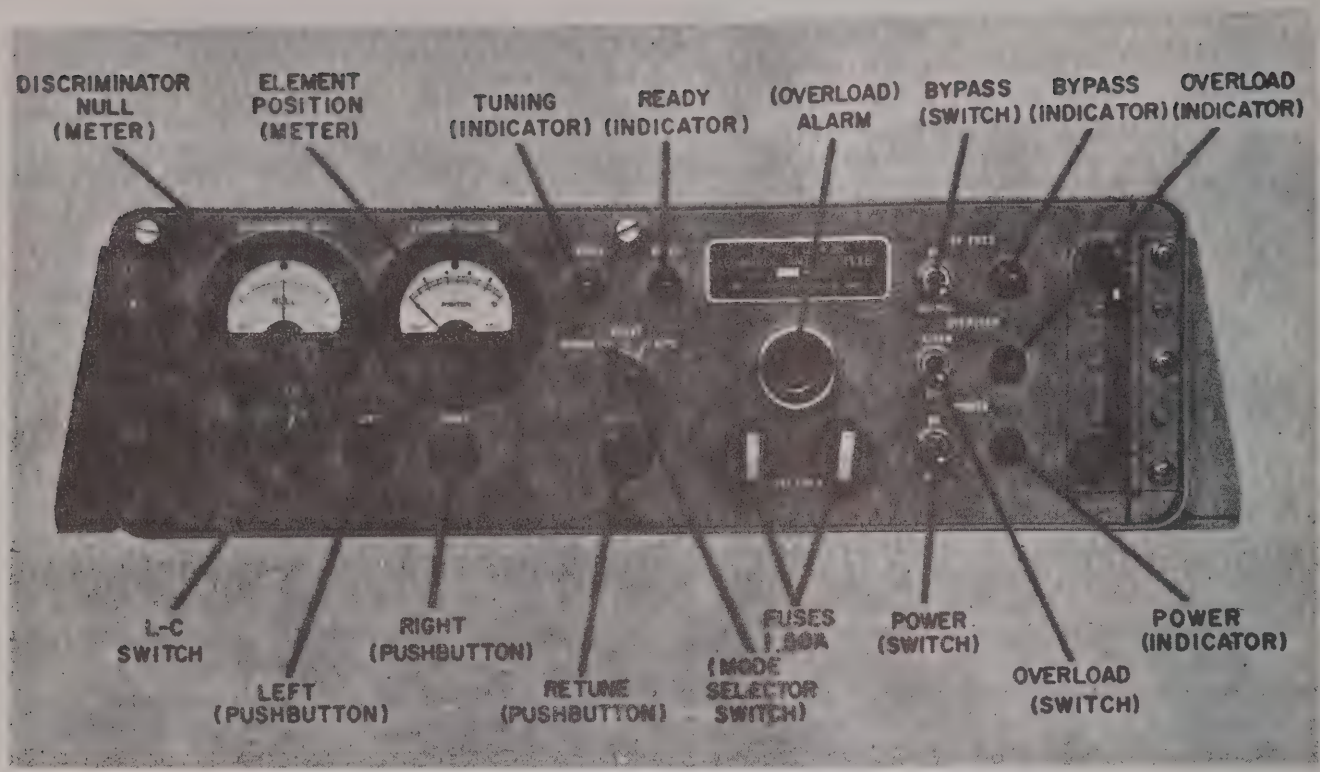


Figure 3-3. Antenna Coupler Control C-3698/URA-38, Operating Controls and Indicators

TABLE 3-3. ANTENNA COUPLER CONTROL C-3698/URA-38, OPERATING CONTROLS AND INDICATORS

CONTROL/INDICATOR	FUNCTION
DISCRIMINATOR NULL meter	Provides an indication of L or C element mistuning as selected by L-C switch during manual mode of operation.
ELEMENT POSITION meter	Provides an indication of L or C element positioning as selected by L-C switch.
L-C switch	Selects metering and switching required to tune L or C element during manual and silent modes of operation.
LEFT pushbutton	When depressed, tuning element selected by L-C switch is repositioned in a direction which moves deflection of DISCRIMINATOR NULL or ELEMENT POSITION meter to left of scale.

TABLE 3-3. ANTENNA COUPLER CONTROL C-3698/URA-38, OPERATING CONTROLS AND INDICATORS (Cont)

CONTROL/INDICATOR	FUNCTION
RIGHT pushbutton	When depressed, tuning element selected by L-C switch is repositioned in a direction which moves deflection of DISCRIMINATOR NULL or ELEMENT POSITION meter to right of scale.
TUNING indicator	Glows when either servo motor is operating.
READY indicator	Glows when elements have been correctly tuned during automatic mode of operation.
Mode Selector switch	Selects AN/URA-38 mode of operation. Switch Position — Equipment Response MANUAL — Permits manual tuning. SILENT — Permits coarse manual tuning without RF power. Fine tuning is automatic. AUTO — All tuning is automatic.
RETUNE pushbutton	When depressed with Mode Selector switch at AUTO or SILENT, a home cycle is initiated.
Overload alarm	Provides an audible, indication when a pressure or temperature overload exists in the CU-938/URA-38. (OVERLOAD switch must be set at ALARM.)
FUSES 1. 50A (with indicators)	Protects the AN/URA-38 against overload; indicator glows when fuse is open.
BYPASS switch	When set at ON, the CU-938/URA-38 matching network is bypassed whenever transmitter is not keyed, allowing reception to be made on a frequency different from that used for transmission.

TABLE 3-3. ANTENNA COUPLER CONTROL C-3698/URA-38, OPERATING CONTROLS AND INDICATORS (Cont)

CONTROL/INDICATOR	FUNCTION
BYPASS switch (cont)	When set at NORMAL, CU-938/URA-38 matching network is in RF signal path during both receive and transmit operation.
BYPASS indicator	Glows when CU-938/URA-38 matching network is bypassed.
OVERLOAD switch	When set at ALARM, audible overload alarm is connected to overload circuit.
OVERLOAD indicator	Glows to provide a visual indication when a pressure or temperature overload exists in CU-938/URA-38.
POWER switch	Controls primary power application to AN/URA-38.
POWER indicator	Glows when AN/URA-38 is energized.

Note

For emergency shut-down, set AM-3924(P)/URT PRIMARY POWER switch at OFF.

3-30. INITIAL SET-UP.

3-31. The following procedures only need be performed the first time the system is energized during any one given operating period.

Note

When setting equipment (T-827/URT) to desired operational frequency, assure proper dial frequency offset from assigned frequency (where appropriate) in accordance with the instruction procedure in JANAP-195, Basic Armed Forces Communication Plan.

a. Set all controls as listed in table 3-4.

b. Set AM-3924(P)/URT PRIMARY POWER switch at ON.

c. Set T-827/URT Mode Selector switch at STD BY. AM-3924(P)/URT blower will energize, and STANDBY indicator will light. PP-3916/UR (if used) POWER ON indicator will light.

TABLE 3-4. PRELIMINARY SETTINGS

EQUIPMENT	CONTROL	SETTING
T-827/URT	Mode Selector switch LOCAL-REMOTE switch	OFF LOCAL
AM-3924(P)/URT	PRIMARY POWER switch Overload switch Key switch FREQUENCY MC switch	OFF ALARM NORMAL AUTOMATIC
C-3698/URA-38	OVERLOAD switch POWER switch BYPASS switch	ALARM OFF NORMAL
Other Exciters	Primary Power switch	OFF
Other Antenna Couplers	Primary Power switch	OFF

Note

After three minutes, AM-3924(P)/URT time delay relay will energize, and system can be operated. However, the T-827/URT frequency standard should have a 20-minute warm-up period for general operation, and at least a 60-minute warm-up period for optimum frequency stability.

d. Set T-827/URT Mode Selector switch at ISB, LSB, or USB. After the three minute warm up period has elapsed, the AM-3924(P)/URT STANDBY indicator will extinguish, and OPERATE indicator will light.

e. Set AM-3924(P)/URT Multipurpose meter switch at PA-DRIVER SCRNS VOLTS. Multipurpose meter should indicate 320 ±30 VDC.

f. Set Multipurpose meter switch at DRIVER PLATE VOLTS. Multipurpose meter should indicate 500 ±50 VDC at nominal line voltage.

g. Set Multipurpose meter switch at PA PLATE VOLTS. Multipurpose meter should indicate 2250 ±225 VDC at nominal line voltage.

h. Open access door on AM-3924(P)/URT front panel. Set Key switch at LOCAL KEY. Set Multipurpose meter switch at PA PLATE 1 AMPERES and then at PA PLATE 2 AMPERES. Note Multipurpose meter indication at both settings.

CAUTION

Excessive plate current (above 330 MA) will damage the AM-3924(P)/URT final amplifier tubes. Do not key system for long periods until the PA BIAS is properly adjusted.

i. Set Multipurpose meter switch at the position which provided the lowest indication in step h.

j. Observe Multipurpose meter and carefully rotate PA BIAS control to provide an indication of 240 MA.

k. Set Multipurpose meter switch to the position not used in step i. Multipurpose meter should indicate a maximum of 280 MA.

Note

A greater degree of linearity can be obtained by adjusting the PA BIAS control so that both plate currents are in the 290 to 330 MA range. However, this should not be done unless specifically directed, since the life will be greatly reduced.

l. Set Multipurpose meter switch at DRIVER 1 AMPERES and then at DRIVER 2 AMPERES. Note Multipurpose meter indication at both settings. The lower indication should be between 280 and 340 MA, and the higher indication should not exceed 400 MA.

m. Set AM-3924(P)/URT Key Switch at NORMAL.

n. Proceed to paragraph 3-32 and tune system as required.

3-32. TUNING.

3-33. The required tuning procedures depend on the mode of operation used when operating with the AN/URA-38 or the type of antenna coupler used in place of the NA/URA-38. Select the correct tuning procedure from the information provided in paragraphs 3-34 through 3-37.

3-34. ANTENNA COUPLER GROUP AN/URA-38 AUTOMATIC TUNING. To tune the system when operating with the AN/URA-38 in an automatic mode, proceed as follows:

Note

The AN/URA-38 will not automatically tune when the T-827/URT Mode Selector switch is set at CW or FSK unless diode CR7 connected between contacts 2 and 12 of the T-827/URT Mode Selector switch Wafer A2S2D-rear is shorted. Therefore, short this diode or set the Mode Selector switch at some other operate position.

a. Set the C-3698/URA-38 Mode Selector at AUTO.

b. Set C-3698/URA-38 POWER switch at ON. POWER indicator should light. TUNING indicator should light briefly unless tuning elements are already at the home position.

c. Set T-827/URT MCS and KCS controls, and CPS switch at desired operating frequency. Selected frequency will be displayed in small windows above MCS and KCS controls.

AM-3924(P)/URT OPERATE indicator will extinguish while T-827/URT is automatically tuning. Dial behind FREQUENCY MC window will rotate as AM-3924(P)/URT automatically tunes to band including selected frequency.

d. Momentarily set AM-3924(P)/URT Key switch at LOCAL KEY. C-3698/URA-38 TUNING indicator will briefly light, and then READY indicator will light.

e. Hold AM-3924(P)/URT Key switch at TUNE KEY. Note AM-3924(P)/URT Power meter indication.

f. Rotate and hold AM-3924(P)/URT Power meter switch at REFL PWR 0-150 long enough to note Power meter indication. Release Key switch.

g. Indication in step e should be at least 25 times greater than indication in step f. If indication is correct, the system is tuned and ready for operation. Proceed to paragraph 3-38. If indication is not correct, momentarily depress C-3698/URA-38 RETUNE switch. C-3698/URA-38 READY indicator will extinguish and TUNING indicator will light briefly.

h. Repeat steps d through f. If indication is still not correct, set T-827/URT Mode Selector switch at STD BY and inform maintenance personnel.

3-35. ANTENNA COUPLER GROUP AN/URA-38 SILENT TUNING. When the AN/URT-23 (V) is operated with the AN/URA-38 under radio silence conditions, the system may be tuned for operation without using RF power as follows:

a. Set C-3698/URA-38 Mode Selector switch at SILENT.

b. Set C-3698/URA-38 POWER switch at ON. POWER indicator will light. TUNING indicator will briefly light unless tuning elements are already at home.

Note

The C-3698/URA-38 READY indicator does not function during silent tuning.

c. Set the T-827/URT MCS and KCS controls, and CPS switch at desired operating frequency. Selected frequency will be displayed in small windows above MCS and KCS controls. AM-3924(P)/URT OPERATE indicator will extinguish while T-827/URT is automatically tuning. Dial behind FREQUENCY MC window will rotate as AM-3924(P)/URT automatically tunes to band including selected frequency.

d. Set C-3698/URA-38 L-C switch at L.

Note

Pre-recorded C-3698/URA-38 ELEMENT POSITION meter indications at the desired operating frequency for both L and C positions of L-C switch will be required.

e. Observe C-3698/URA-38 ELEMENT POSITION meter indication, and depress LEFT or RIGHT pushbutton as required until indication agrees with indication pre-recorded for operating frequency to be used.

f. Set L-C switch at C and repeat step e.

g. System is now ready to operate. When radio silence is lifted, proceed to paragraph 3-38. The AN/URA-38 will automatically make fine tuning adjustments during normal full power transmissions.

3-36. ANTENNA COUPLER GROUP AN/URA-38 MANUAL TUNING. If manual tuning of the AN/URA-38 is desired or required as a result of automatic tuning circuitry failure, proceed as follows:

Note

The C-3698/URA-38 READY indicator does not function during manual operation.

a. Set T-827/URT MCS and KCS controls, and CPS switch at desired operating frequency. Selected frequency will be displayed in small windows above MCS and KCS controls. AM-3924(P)/URT OPERATE indicator will extinguish while T-827/URT is automatically tuning. Dial behind FREQUENCY MC window will rotate as AM-3924(P)/URT automatically tunes to band including selected frequency.

b. Set C-3698/URA-38 Mode Selector switch at MANUAL.

c. Set the C-3698/URA-38 POWER switch at ON.

d. Set C-3698/URA-38 L-C switch at C.

e. Depress C-3698/URA-38 RIGHT pushbutton until TUNING indicator extinguishes.

f. Momentarily depress LEFT pushbutton.

g. Set C-3698/URA-38 L-C switch at L and repeat step e.

h. Open AM-3924(P)/URT front panel access door. Hold Key switch at TUNE KEY through step k.

i. Depress C-3698/URA-38 LEFT pushbutton until a center (NULL) indication is obtained on DISCRIMINATOR NULL meter.

j. Set C-3698/URA-38 L-C switch at C, and repeat step i.

Note

L and C adjustments will affect each other. The null at some frequencies is very sharp. This requires that step k be performed very slowly and carefully to obtain a tuned (NULL) indication.

k. Alternately set the C-3698/URA-38 L-C switch at L and C and depress the LEFT and RIGHT pushbutton momentarily as required to move the DISCRIMINATOR NULL meter indication to the center mark for both settings of L-C switch.

l. Release AM-3924(P)/URT Key switch and close front panel access door.

m. The system is now tuned. Refer to paragraph 3-38 and operate as desired.

3-37. TUNING WITH AN ANTENNA COUPLER OTHER THAN AN/URA-38. The AN/URT-23(V) will normally be operated with Antenna Coupler Group AN/URA-38. However, the AN/URT-23(V) may be operated with any 1 KW antenna coupler or tuned antenna system which will match the impedance of the antenna to the 50-ohm transmission line output of the AM-3924(P)/URT at the transmitting frequency. To tune the system for this type of operation, proceed as follows:

a. Refer to antenna coupler technical manual to determine the RF power input required during tuning, and if required, adjust the AM-3924(P)/URT tune power output according to paragraph 2-35.

b. Set T-827/URT MCS and KCS controls, and CPS switch at desired operating frequency. Selected frequency will be displayed in small windows above MCS and KCS controls. AM-3924(P)/URT OPERATE indicator will extinguish while T-827/URT is automatically tuning. Dial behind FREQUENCY MC window will rotate as AM-3924(P)/URT automatically tunes to band including selected frequency.

c. Hold AM-3924(P)/URT Key switch at TUNE KEY. Perform the required steps to match antenna impedance to 50 ohm transmission line output of AM-3924(P)/URT.

d. Release AM-3924(P)/URT Key switch and proceed to paragraph 3-38.

3-38. OPERATION.

3-39. After the system has been tuned, the AN/URT-23(V) may be operated either locally or remotely. Paragraphs 3-40 and 3-41 provide the required information to operate in either condition.

3-40. LOCAL OPERATION. To operate the system locally, proceed as follows:

a. Set T-827/URT LOCAL-REMOTE switch at LOCAL.

b. Set T-827/URT Mode Selector switch at desired operating mode as follows:

1. For voice transmission, set Model Selector switch at USB, LSB, or AM and connect handset to HANDSET connector.

2. To transmit CW, set Mode Selector switch to CW, and connect CW key to KEY jack on front panel.

3. To transmit FSK, set Mode Selector switch at FSK.

4. To transmit FSK and voice simultaneously, set Mode Selector switch at ISB/FSK. (FSK will be on USB, voice on LSB.)

5. To transmit voice alternately on LSB and USB, set Mode Selector switch at ISB and alternate LOCAL ISB HANDSET switch between USB and LSP as desired.

c. Key transmission as required.

d. If a receiver is connected to the antenna through the AM-3924(P)/URT, and it is desired to receive on a frequency different from the transmitting frequency, set C-3698/URA-38 BYPASS switch at ON. BYPASS indicator will light whenever system is not keyed.

e. During operation, the AM-3924(P)/URT Power meter indication should be monitored to assure that the antenna system maintains itself in a tuned condition. (With normal input power, a decrease in forward power will indicate abnormal operation which may be due to an improperly tuned antenna system.)

f. To change mode of operation, perform step b.

g. To change transmitting frequency, repeat the necessary procedures in paragraph 3-32.

h. If during operation the OVERLOAD circuits of either the AN/URA-38 or AN/URT-23 (V) trip, an audible and visual indication of the condition will be present. The key interlock will energize, preventing operation. Set Overload switch momentarily at RESET. If OVERLOAD indicator and alarm remain on, refer problem to maintenance personnel.

3-41. REMOTE OPERATION. To operate the system remotely, proceed as follows:

a. Set T-827/URT LOCAL-REMOTE switch at REMOTE.

b. Select a mode of operation (step b (1) through (4) of paragraph 3-40). In addition, remote operation allows simultaneous transmission of voice on both LSB and USB when Mode Selector is set at ISB.

c. Perform steps c through g of paragraph 3-40 as required.

d. Select desired remote control unit by switch selection at the transmitter switchboard.

3-42. SHUT-DOWN.

3-43. To shut-down the AN/URT-23(V) at the end of normal operation, proceed as follows:

Note

For emergency shutdown only, set the AM-3924(P)/URT PRIMARY POWER switch at OFF.

a. Ensure that the system is unkeyed.

Note

If AN/URT-23(V) is to be shut down for a brief period, set T-827/URT Mode Selector switch at STD BY. Leaving the T-827/URT in the standby mode assures maximum frequency accuracy. The T-827/URT frequency standard and AM-3924(P)/URT tube filaments will remain energized, so that the system can immediately be returned to full operation by setting the T-827/URT Mode Selector switch to the desired mode.

b. Turn off all associated equipment.

c. Set T-827/URT Mode Selector switch at OFF.

d. Set AM-3924(P)/URT PRIMARY POWER switch at OFF.

e. Set C-3698/URA-38 POWER switch at OFF.

3-44. OPERATOR MAINTENANCE.

3-45. OPERATING CHECKS.

3-46. When a system malfunction is encountered, the operator should perform the following checks to determine the cause and extent of the trouble.

a. Refer to the operating procedures and carefully check to ensure that no vital step has been omitted.

b. Attempt to operate in another mode.

c. Check all front panel fuses. If any are open, the associated indicator lamps will light. Replace open fuses. If fuse opens again, refer problem to maintenance personnel.

d. Determine that all cable connections are properly seated and tight, and that the cables are undamaged.

e. Determine that operation has not been interrupted by an interlock switch (equipment not properly seated in its case with front panel screws tightened).

3-47. PREVENTIVE MAINTENANCE.

3-48. To maintain the AN/URT-23(V) in a condition which will assist in ensuring dependable performance, the operator should perform the following maintenance checks and measures on a regularly established schedule. Refer to NAVSHIPS 0967-032-0020 for operator's preventive maintenance on the T-827/URT.

WARNING

Ensure that all equipment is de-energized and that the primary power is secured at the source.

a. Remove and clean the AM-3924(P)/URT air filter. Use water and a small amount of soap or liquid detergent. Dry thoroughly before replacing.

b. Check the mechanical action of each switch and control. Report any indications of excessive wear or damage to higher echelon maintenance.

c. Ensure that each fuse holder contains a fuse of the proper value.

d. Loosen the six front panel screws on the AM-3924(P)/URT and slide the chassis out from the case. Inspect the chassis interior for signs of mechanical damage, rust, or corrosion.

e. Inspect all wiring for signs of fraying, or damage. Pay particular attention to the cables between the rear of the chassis and the case, and on the bottom of the chassis.

f. Ensure that each subassembly is secure in its mounting. Check the complete chassis, front panel, and case for loose parts, or hardware. Tighten loose hardware.

g. Check the tension of the drive chain on the frequency selector mechanism. The chain should be tight, without excessive strain. Inspect sprocket assemblies for damage or wear.

h. Ensure that all high voltage shields are in place.

i. Open the hinged front panel of the PP-3916/UR and inspect the interior for signs of mechanical damage, rust, and corrosion.

j. Use a soft bristle brush and a lint free cloth to clean all available portions of the interior and exterior of the equipments.

k. Push the AM-3924(P)/URT back into its case, and close the hinged front panel of the PP-3916/UR. Secure each equipment with its front panel screws.

3-49. EMERGENCY MAINTENANCE.

3-50. If an equipment malfunction occurs when a technician is not available, attempt to determine the cause in a systematic manner. Perform the operating checks called out in paragraph 3-45. Attempt to isolate the fault to an equipment function. An intelligent description of the fault will be of great assistance to the maintenance personnel. Table 3-5 lists some of the more probable symptoms of equipment malfunction, and their causes. Notify higher echelon maintenance when the malfunction cannot be corrected at the operator level.

TABLE 3-5. COMMON SYMPTOMS OF SYSTEM MALFUNCTION

SYMPTOM	PROBABLE FAULT
Equipment will not energize	1. No primary power input. Check primary power source. Check power fuses. Check interlock switches. 2. T-827/URT internal power switch in AUX position. Set at NORMAL. 3. Check EXCITER-COUPLER fuse and T-827/URT fuses.
STANDBY indicator illuminates, blower does not operate.	Open BLOWER fuse.
OPERATE indicator does not illuminate, all Multipurpose meter indications zero.	1. Faulty T-827/URT. 2. Faulty AM-3924(P)/URT.

TABLE 3-5. COMMON SYMPTOMS OF SYSTEM MALFUNCTIONS (Cont)

SYMPTOM	PROBABLE FAULT
No driver screen voltage.	Faulty AM-3924(P)/URT.
No driver plate voltage or screen voltage.	Open 500 VDC 1.5A fuse. (AM-3924(P)/URT or PP-3916/UR)
No PA plate voltage.	Faulty AM-3924(P)/URT, PP-3916/UR, or PP-3917/UR.
No input power when AN/URT-23(V) is keyed.	Faulty T-827/URT; interconnecting coaxial cable (M/W 1A2J9).
No driver or PA plate current (system will not key).	1. Jumper plug not installed in 1A2J8. 2. Faulty AM-3924(P)/URT.
Excessive driver plate currents	Faulty AM-3924(P)/URT.
OVERLOAD indicator illuminates (system not keyed).	1. Time elapsed meter has completed cycle, 1000 hour maintenance due (paragraph 5-29) 2. AM-3924(P)/URT high voltage interlock or PP-3916/UR interlock open; jumper plug missing on 1A2J1 if PP-3917/UR is in use. 3. AM-3924(P)/URT blower not operating.
OVERLOAD indicator illuminates when system is keyed.	Excessive current in one or both of the PA tubes, due to faulty tube or improper RF output load. Check reflected power.
Low power output.	1. Improper RF load. Check reflected power. 2. Low RF input to AM-3924(P)/URT. Check input power. 3. Faulty AM-3924(P)/URT.
Excessive reflected power (VSWR greater than 4:1).	1. Improperly tuned antenna coupler. 2. Faulty transmission line. 3. Loss of antenna.

SECTION 4

TROUBLESHOOTING

4-1. LOGICAL TROUBLESHOOTING.

4-2. The following six logical steps should be followed when troubleshooting Radio Transmitting Set AN/URT-23(V).

4-3. SYMPTOM RECOGNITION.

4-4. Symptom recognition, the first step in the troubleshooting procedure, is based on complete knowledge and understanding of equipment operating characteristics. Not all equipment troubles are the direct result of component failure; therefore, a trouble in the equipment is not always easy to recognize, since conditions of less than peak performance are not always apparent. This type of trouble is usually discovered during preventive maintenance, such as the Performance Operation and Maintenance Standards of Electronic Equipment (POMSEE) checks.

4-5. SYMPTOM ELABORATION.

4-6. After an equipment trouble has been recognized, use of front panel controls and other built-in indicating or testing aids should verify the original symptom. Checking or manipulating the setting of the operating controls may eliminate the trouble. Common troubles and an isolation procedure for each are listed in paragraph 4-143.

4-7. LISTING PROBABLE FAULTY FUNCTION.

4-8. The next step in the logical troubleshooting is to list some "logical choices" of the cause and likely location (functional section) of the trouble. The "logical choices" are based on knowledge of the equipment operation, identification of the trouble symptom, and information contained in this manual. Refer to the Radio Transmitting Set AN/URT-23(V) functional description and associated functional block diagram.

4-9. LOCALIZING THE FAULTY FUNCTION.

4-10. For best efficiency in localizing trouble, the "logical choices" should be checked in the order that will require the least time; a selection is required to determine which section to test first. The selection should be based on the validity of the "logical choice" and the difficulties involved in making the necessary tests. If the tests do not prove that functional section is at fault, the next selection should be tested, and so on until the faulty functional section is located.

4-11. Voltage levels are included at significant check points on servicing block diagrams to aid in isolating the faulty functional section. Test data (such as information on control settings, critical adjustments, and required test equipment) are supplied to augment the functional description and servicing block diagrams.

4-12. LOCALIZING TROUBLE TO THE CIRCUIT.

4-13. After the faulty functional section has been isolated, it is often necessary to make additional "logical choices" as to which circuit(s) within the functional section is at fault. The servicing block diagrams provide the signal flow and test location information needed to bracket and then isolate the faulty circuit. Table 5-5 provides a listing of transistor DC voltage level for various operating conditions. Functional descriptions, simplified schematics, and pertinent test data for individual circuits (stages) of the functional section are in one area of the manual. Usually this information is on facing pages. Information too lengthy for this arrangement is in the test data portion of the troubleshooting information.

4-14. FAILURE ANALYSIS.

4-15. After the trouble (faulty component, misalignment, etc.) has been located, but prior to corrective action, the procedures followed up to this point should be reviewed to determine why the fault affected the equipment as it did. This review is necessary to make certain that the fault discovered is actually the cause of the malfunction and not a result of the malfunction.

4-16. FUNCTIONAL DESCRIPTION.

4-17. GENERAL.

4-18. Figure 4-1 illustrates the functional relationship of the AN/URT-23(V) in a typical radio set configuration. The T-827/URT allows the operator to select a voice (LSB, USB, ISB, or Compatible AM), CW, or FSK mode of operation on any one of 56,000 or 280,000 channels (depending on model of T-827/URT used) in the 2.0 to 29.9995 MC frequency range. When an operating channel is selected, the T-827/URT supplies a five wire code to the AM-3924(P)/URT to automatically tune it to the correct operating band. Once the AM-3924(P)/URT is tuned, the antenna coupler must be tuned to match the impedance of the antenna at the selected operating frequency to the 50 ohm transmission line of the AM-3924(P)/URT. When Antenna Coupler Group AN/URA-38 is the antenna coupler system used, the necessary control signals are passed between the AM-3924(P)/URT, T-827/URT, and AN/URA-38 to automatically tune the AN/URA-38 for the selected operating frequency.

4-19. When the system tuning is completed, a full power voice, CW, or FSK transmission can be keyed at the selected frequency and mode of operation. Voice and CW transmissions also can be keyed from any one of up to three remotely positioned Radio Set Controls C-1138/UR. Once a transmission is keyed, the T-827/URT produces a nominal 0.1 watt RF output to the AM-3924(P)/URT. The AM-3924(P)/URT linearly amplifies the RF output from the T-827/URT to 1 KW of PEP or average power for application through the antenna coupler matching network to the system antenna for radiation. During transmission, overload circuits continually monitor the system for an abnormal condition. If an overload develops, either in the AN/URT-23(V) or AN/URA-38, the entire system is unkeyed and locked off until the condition is corrected. In addition, an overload alarm and indicator on either the AM-3924(P)/URT or the AN/URA-38 is energized to provide visual and audible indication of the condition. The AM-3924(P)/URT develops and applies DC control signals to the T-827/URT to maintain the peak and average power levels of the transmission at a constant pre-determined value. This compensates for system gain variations, thereby preventing the RF power output from decreasing below rated levels or exceeding a safe limit. A transmit/receive relay is used in the AM-3924(P)/URT to connect the system antenna to an auxiliary receiver whenever a transmission is not being made.

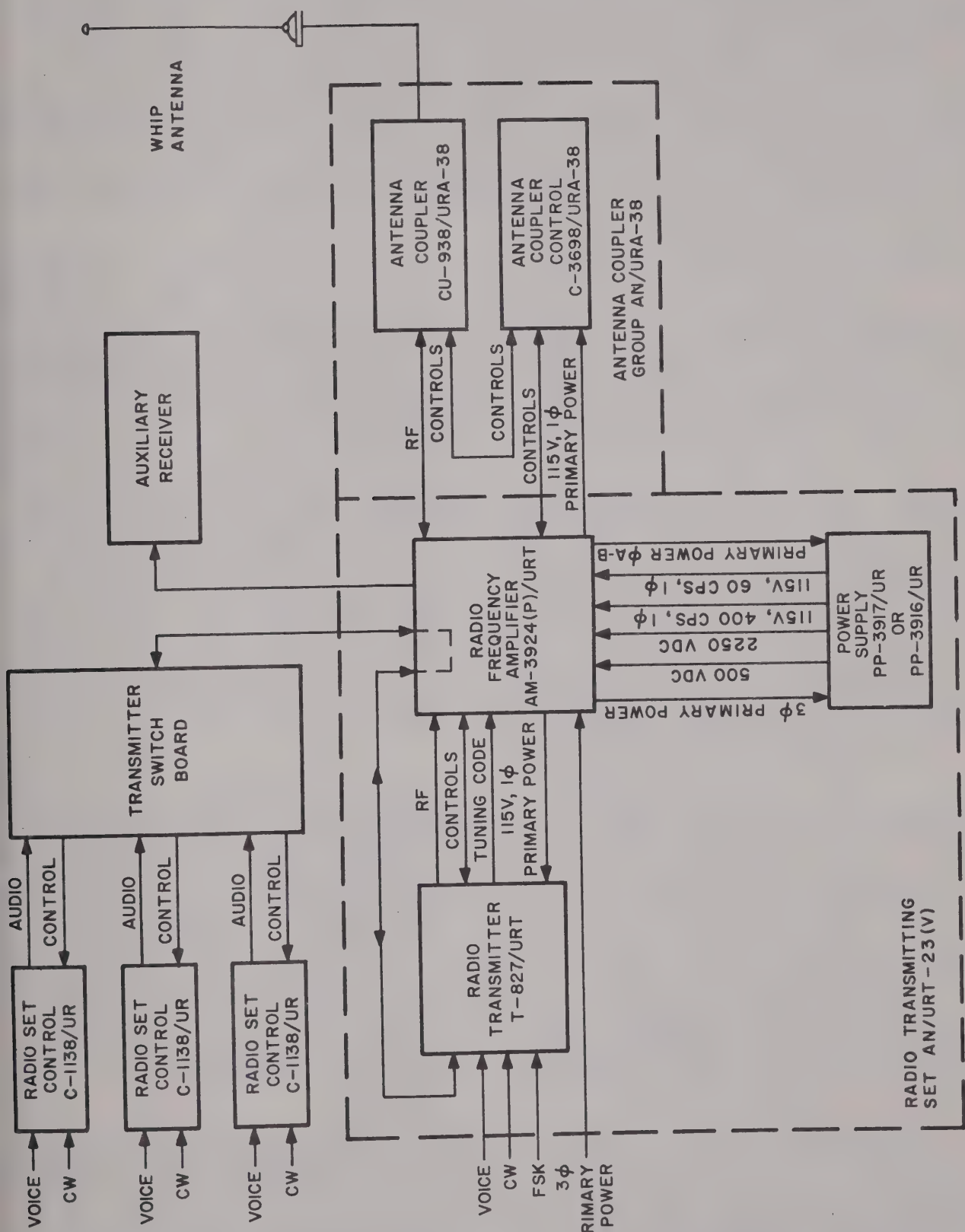


Figure 4-1. Typical Radio Set Block Diagram

4-20. The system operates from either a 208 or 440 volt, 60 CPS three phase source or a 115 volt, 400 CPS, three phase source. Only one power supply is used, depending on the frequency of the primary power: the PP-3916/UR with a 60 CPS source or the PP-3917/UR with a 400 CPS source. When the AM-3924(P)/URT is turned on, phases A and B are applied to the power supply for conversion to single phase 115 volt power of the same frequency as the three phase primary power. This 115 VAC is applied as primary power to the T-827/URT and/or AN/URA-38. When the system is placed in standby, the power supply produces single phase power at both 115 VAC, 400 CPS and 115 VAC, 60 CPS for the control circuits in the AM-3924(P)/URT. When the system is placed in operate, the three phase primary power is applied to the 500 and 2250 VDC power supply to supply high voltage to the electron tubes within the AM-3924(P)/URT.

4-21. RADIO TRANSMITTING SET AN/URT-23(V).

4-22. The AN/URT-23(V) (figure 4-2) is a 1 KW radio transmitting set which consists of an exciter (the T-827/URT), a linear power amplifier (the AM-3924(P)/URT), and a power supply (the PP-3916/UR or PP-3917/UR depending on the frequency of the primary power). For information concerning operation of the T-827/URT, refer to NAVSHIPS 0967-032-0010. The AN/URT-23(V) is normally operated with the AN/URA-38 (an automatic antenna coupler system) and an auxiliary receiver such as the R-1051/URR.

4-23. The AM-3924(P)/URT is driven by a low-level (nominal 100 MW) RF output from the T-827/URT. Two stages of amplification (a driver amplifier and a final amplifier) are used to linearly amplify this input to a level of 1 KW. Each stage consists of two parallel connected electron tubes and operates into one of nineteen pretuned transformer assemblies. The transformer assemblies for each stage are automatically switched into the circuit according to the operating frequency (paragraph 4-24). The 1 KW output from the final amplifier is applied through the VSWR bridge and the antenna transfer relay to the antenna coupler system. The VSWR bridge samples both reflected and forward power for application to the front panel Power meter for measurement and monitoring. In addition, the VSWR bridge supplies the necessary signals for the APC and PPC circuits to develop their respective control voltages. The antenna transfer relay connects the antenna to an auxiliary receiver when the system is not keyed.

4-24. An open-seeking circuit which employs a five-wire coding scheme is used to automatically bandswitch the correct transformer assemblies into the driver and final amplifier circuits. The code is generated either by an encoder within the T-827/URT, or internally by an encoder within the AM-3924(P)/URT when the T-827/URT is not used. In either case, the code consists of a pattern of opens and grounds which establishes a ground path to one side of a relay coil through a decoder switch in the AM-3924(P)/URT bandswitching system. This ground path energizes the relay and in turn a motor, which rotates the decoder and bandswitch assemblies until the ground path is broken. While a new channel is being selected, an inhibit signal is applied to the keying circuit to prevent the system from being keyed before the switches have stopped in the correct position. The power for driving the tuning motor is 115 VAC, 60 CPS, obtained either from the PP-3917/UR 60 CPS inverter assembly or from the PP-3916/UR, depending on the frequency of the primary power source.

4-25. The VSWR bridge supplies a signal to the APC-PPC circuit which is, in essence, the envelope of the RF output from the system. This signal is used to develop one control voltage which is proportional to the peak power output from the system and another which is proportional to the average power. Both control voltages are applied to the T-827/URT, in which they are used to maintain the power output from the system at a constant 1 KW PEP. This closed loop circuit ensures that the RF power output is maintained at the rated level as

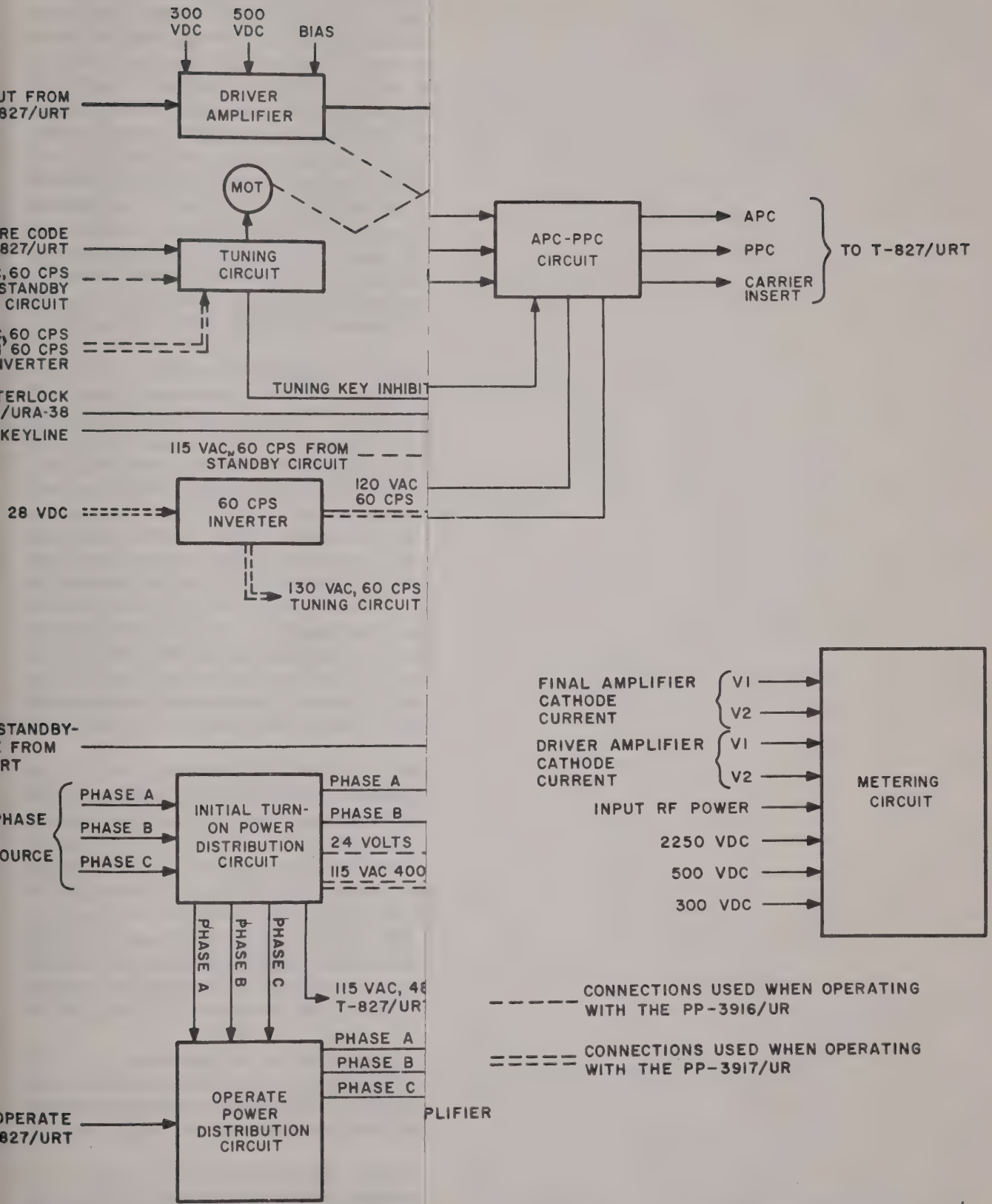


Figure 4-2. Radio Transmitting Set AN/URT-23(V), Functional Block Diagram

4-20. The system operates from either a 208 or 440 volt, 60 CPS three phase source or a 115 volt, 400 CPS, three phase source. Only one power supply is used, depending on the frequency of the primary power: the PP-3916/UR with a 60 CPS source or the PP-3917/UR with a 400 CPS source. When the AM-3924(P)/URT is turned on, phases A and B are applied to the power supply for conversion to single phase 115 volt power of the same frequency as the three phase primary power. This 115 VAC is applied as primary power to the T-827/URT and/or AN/URA-38. When the system is placed in standby, the power supply produces single phase power at both 115 VAC, 400 CPS and 115 VAC, 60 CPS for the control circuits in the AM-3924(P)/URT. When the system is placed in operate, the three phase primary power is applied to the 500 and 2250 VDC power supply to supply high voltage to the electron tubes within the AM-3924(P)/URT.

4-21. RADIO TRANSMITTING SET AN/URT-23(V).

4-22. The AN/URT-23(V) (figure 4-2) is a 1 KW radio transmitting set which consists of an exciter (the T-827/URT), a linear power amplifier (the AM-3924(P)/URT), and a power supply (the PP-3916/UR or PP-3917/UR depending on the frequency of the primary power). For information concerning operation of the T-827/URT, refer to NAVSHIPS 0967-032-0010. The AN/URT-23(V) is normally operated with the AN/URA-38 (an automatic antenna coupler system) and an auxiliary receiver such as the R-1051/URR.

4-23. The AM-3924(P)/URT is driven by a low-level (nominal 100 MW) RF output from the T-827/URT. Two stages of amplification (a driver amplifier and a final amplifier) are used to linearly amplify this input to a level of 1 KW. Each stage consists of two parallel connected electron tubes and operates into one of nineteen pretuned transformer assemblies. The transformer assemblies for each stage are automatically switched into the circuit according to the operating frequency (paragraph 4-24). The 1 KW output from the final amplifier is applied through the VSWR bridge and the antenna transfer relay to the antenna coupler system. The VSWR bridge samples both reflected and forward power for application to the front panel Power meter for measurement and monitoring. In addition, the VSWR bridge supplies the necessary signals for the APC and PPC circuits to develop their respective control voltages. The antenna transfer relay connects the antenna to an auxiliary receiver when the system is not keyed.

4-24. An open-seeking circuit which employs a five-wire coding scheme is used to automatically bandswitch the correct transformer assemblies into the driver and final amplifier circuits. The code is generated either by an encoder within the T-827/URT, or internally by an encoder within the AM-3924(P)/URT when the T-827/URT is not used. In either case, the code consists of a pattern of opens and grounds which establishes a ground path to one side of a relay coil through a decoder switch in the AM-3924(P)/URT bandswitching system. This ground path energizes the relay and in turn a motor, which rotates the decoder and bandswitch assemblies until the ground path is broken. While a new channel is being selected, an inhibit signal is applied to the keying circuit to prevent the system from being keyed before the switches have stopped in the correct position. The power for driving the tuning motor is 115 VAC, 60 CPS, obtained either from the PP-3917/UR 60 CPS inverter assembly or from the PP-3916/UR, depending on the frequency of the primary power source.

4-25. The VSWR bridge supplies a signal to the APC-PPC circuit which is, in essence, the envelope of the RF output from the system. This signal is used to develop one control voltage which is proportional to the peak power output from the system and another which is proportional to the average power. Both control voltages are applied to the T-827/URT, in which they are used to maintain the power output from the system at a constant 1 KW PEP. This closed loop circuit ensures that the RF power output is maintained at the rated level as

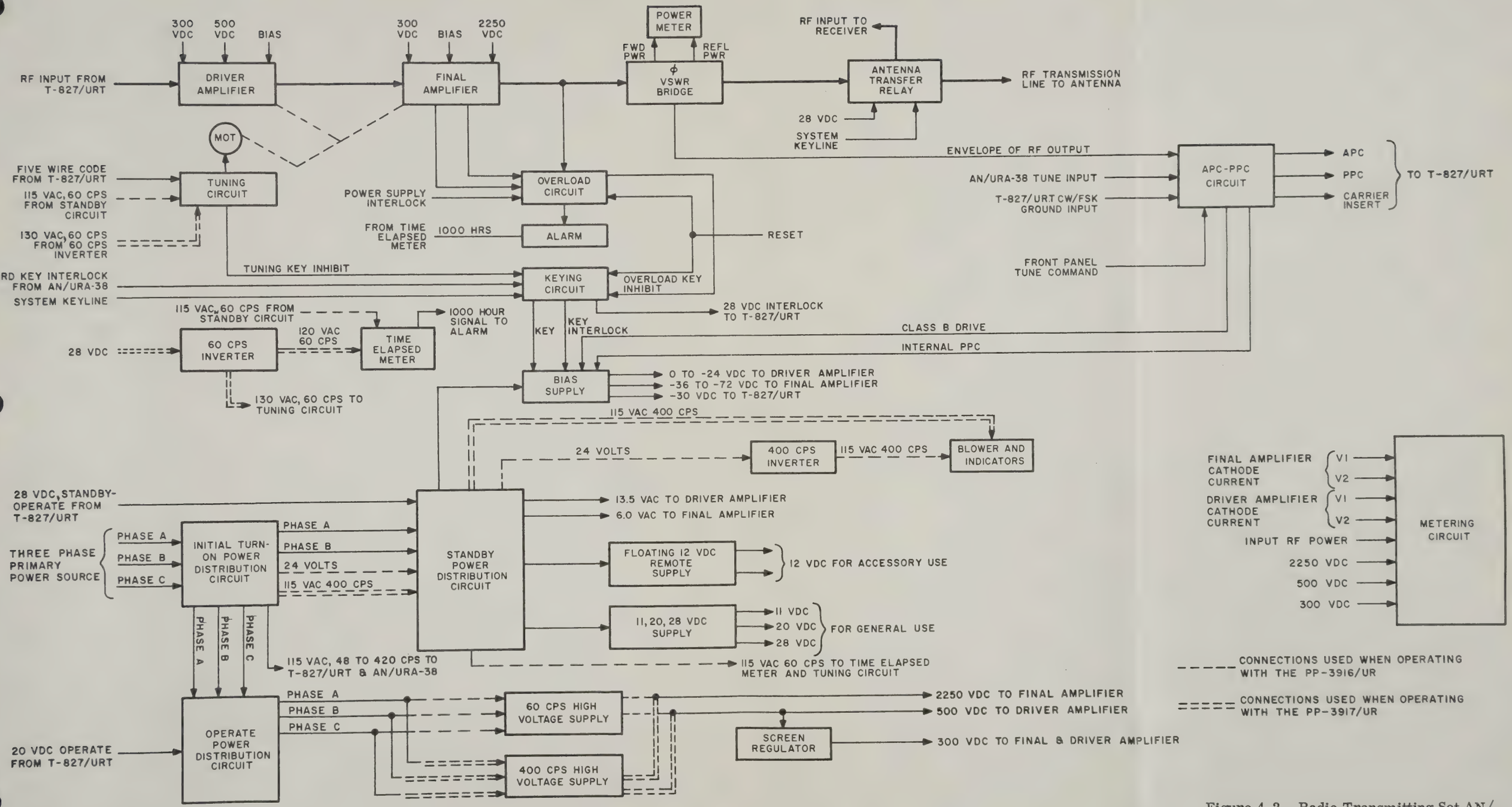


Figure 4-2. Radio Transmitting Set AN/URT-23(V), Functional Block Diagram

well as preventing it from exceeding a safe limit. In addition, the PPC voltage is applied to the AM-3924(P)/URT bias circuits as a protective measure in the event that the control circuits in the T-827/URT fail or that the system is being operated with an exciter that does not have power control capabilities. In this condition, as the peak power output increases beyond its rated level, the bias voltage to the driver amplifier is increased to reduce the RF output. The APC-PPC circuit can also be commanded to reduce the power output from the system to a lower value required for tuning the antenna coupler. This is accomplished either manually with the front panel TUNE KEY switch or automatically by the AN/URA-38. At the same time, a carrier insert signal is supplied to the T-827/URT, causing that unit to provide the single tone carrier output required for tuning. If desired, a resistor in the PPC circuit can be changed in value to enable the tune power level to be set to other values required to tune antenna couplers other than the AN/URA-38. When operating in the CW or FSK mode, the CW/FSK ground from the T-827/URT is used to de-energize the APC detector and switch the PPC output to the T-827/URT APC input. Also, a class B drive signal is produced and applied to the bias power supply (paragraph 4-27) when the CW/FSK ground is present.

4-26. An overload detector is used to continually monitor the plate currents of the two final amplifier tubes, the RF output voltage, and the temperature of the PP-3916/UR. If a dangerous condition occurs in any of these areas, the overload circuit trips and provides an inhibit signal to the keying circuit, preventing further keying of the circuit until the overload has been cleared. When the overload circuit trips, an indicator lamp and an alarm are energized to provide both visual and audible indication that an overload condition has occurred. A front panel switch enables the audible overload alarm to be disabled. The overload circuit can be reset through the front panel RESET switch. However, if the overload was not of a momentary nature, the overload circuit will again immediately trip to prevent keying. In addition, the keying circuit remains inhibited whenever the overload switch is held in the reset position, thus preventing an operator from forcing operation in an overload condition. When the time elapsed meter has recorded 1000 hours of filament-on time for the electron tubes, it trips and energizes the overload indicator and alarm to provide an indication that the tubes should be checked for possible replacement and the time elapsed meter set to zero. However, in this condition, the operate bias for the final amplifier is not prevented from being keyed.

4-27. The AM-3924(P)/URT is keyed on and off through the bias levels applied to the four electron tubes in the final and driver amplifiers. Keying is accomplished by grounding the system keyline at any of the other units or by setting the AM-3924(P)/URT front panel Key switch at TUNE KEY or LOCAL KEY. In any case, the keying circuit switches the bias voltage for the driver and final amplifier electron tubes from cutoff to operate levels. The keying circuit is inhibited (bias maintained beyond cutoff) whenever the tuning motor is energized, an overload occurs, the RESET switch is depressed, or the ground key interlock signal is supplied by the AN/URA-38. Also, whenever the tuning motor is energized or the ground key interlock signal is supplied by the AN/URA-38, the T-827/URT is unkeyed by cutting off the 28 VDC interlock signal that the AM-3924(P)/URT normally supplies to energize the T/R relays in the T-827/URT.

4-28. A metering circuit allows any one of eight parameters of the amplifier tubes to be connected to a meter for measurement or monitoring. These parameters consist of the cathode current of each of the four electron tubes, the input RF power to the driver amplifier, the plate supply voltages, and the screen supply voltage.

4-29. Turn-on is initiated by setting the PRIMARY POWER switch at ON. This action supplies phases A and B of the primary power to either the PP-3916/UR for 60 CPS power or the PP-3917/UR for 400 CPS power. In either case, the power supply converts this

voltage to 115 VAC single phase power of the same frequency as the applied primary voltage. This 115 VAC power is supplied as primary power to the AN/URA-38 and T-827/URT. In addition, phases A and B of the primary power are applied to the low power transformer through an open contact of the standby relay. Further control of the power distribution is now exercised from the T-827/URT.

4-30. When the T-827/URT Mode Selector switch is set at STD BY, a 28 VDC standby-operate signal is generated to energize the standby relay in the AM-3924(P)/URT. One set of the relay contacts switches either 115 VAC, 400 CPS from the PP-3917/UR directly to the indicators and blower, or 24 volts to the 400 CPS inverter in the PP-3916/UR, which in turn produces 115 VAC, 400 CPS output to the blower and indicators. Therefore, 115 VAC, 400 CPS is either directly or indirectly switched to energize the blower and indicators. The other set of relay contacts completes the circuit for phases A and B to the low power transformer. This transformer provides the following outputs: 6.0 VAC filament voltage for the final amplifier tubes, 13.5 VAC filament voltage for the driver amplifier tubes, and the AC inputs to the bias, ±12 VDC remote, and 11, 20, and 28 VDC supplies. In addition, if the primary power source is 60 CPS, the transformer supplies 115 VAC output to the time elapsed meter. The bias supply develops operating and cutoff biases for the final and driver amplifier tubes. In addition, a -36 VDC signal is derived from the bias circuit for the T-827/URT RF delay circuit. The ±12 VDC remote supply produces a floating 12 VDC output for remote use. All low DC voltages required to power the AM-3924(P)/URT control circuits are produced by the 11, 20, and 28 VDC supplies. The 28 VDC is also supplied to the time delay relay heater in the operate circuit and, if the primary power source is 400 CPS, to the 60 CPS inverter in the PP-3917/UR. The 60 CPS inverter produces 120 VAC, 60 CPS power for the time elapsed meter and 130 VAC, 60 CPS power for the tuning motor when operating from a 400 CPS primary power source.

4-31. Three minutes after application of heater power, the time delay relay closes. Thereafter, the system can be placed in an operate condition by setting the T-827/URT Mode Selector switch to any operate position. This supplies the 20 VDC operate signal to the operate circuit to energize the operate relay. Energizing the operate relay applies the three phase primary power to the PP-3916/UR 60 CPS high voltage supply or PP-3917/UR 400 CPS high voltage supply. In either case, the supply converts the three phase primary power to 2250 and 500 VDC. These DC voltages are used for plate power for the final and driver amplifier tubes, respectively. In addition, the 500 VDC drives a regulated 300 VDC screen supply in the AM-3924(P)/URT for both the final and driver amplifier tubes. Energizing the operate relay extinguishes the STANDBY indicator and lights the OPERATE indicator. The system is now energized for operation.

4-32. CIRCUIT DESCRIPTIONS.

4-33. DRIVER AMPLIFIER.

4-34. GENERAL. The driver amplifier (figure 4-3) consists of two electron tubes, and interstage transformer assembly, and various other components. The function of this circuit is to linearly amplify the input from the T-827/URT to a level sufficient to drive the final amplifier (paragraph 4-39).

4-35. CIRCUIT DESCRIPTION. The RF input from the T-827/URT at connector 1A2J9 is applied through connectors 1A2P1 and 1A1J1 and terminal 12 of terminal board TB1 to a nominal 50-Ohm input load consisting of inductor L2 and resistor R6. Inductor L2 compensates for the input capacitance of the two electron tubes. The RF input is also applied to the metering circuit (paragraph 4-89). From the input load, the RF is coupled by capacitor C1 to the grids of the two electron tubes. The two parallel connected electron tubes are

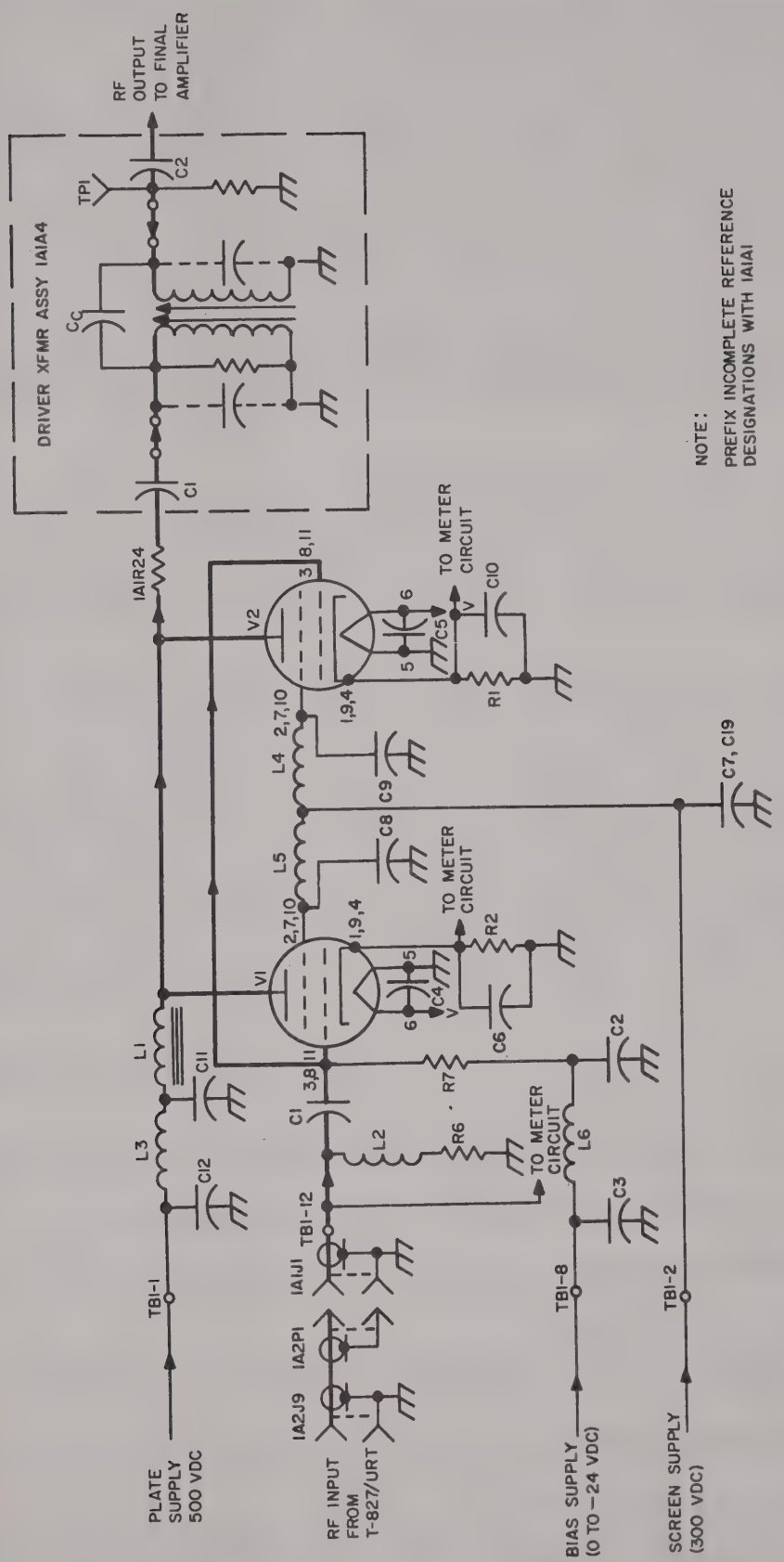


Figure 4-3. Driver Amplifier, Simplified Schematic Diagram

operated as a class A linear amplifier stage that provides a nominal 20 DB of power gain. One of nineteen broadband interstage transformer assemblies is used to couple the RF output from the driver amplifier to the input of the final amplifer.

4-36. The nineteen transformer assemblies are mounted on a motor-driven bandswitch assembly which is switched according to operating frequency to automatically connect the correct transformer assembly into the signal path (paragraph 4-83). Each transformer assembly above 8 MC consists of a double tuned circuit which uses capacitive top coupling. This type of circuit provides a wide flat passband with very sharp skirts, i.e. broadband tuning. Below 8 MC, conventional single tuned circuits are used.

4-37. The voltage drops developed across cathode resistors R1 and R2 are applied to the metering circuit for monitoring and measurement (paragraph 4-89). Each of the power supply input lines (bias, plate, and screen) is filtered to provide RF decoupling. Capacitors C2 through C12 and C19 are local RF bypasses. Resistor 1A1R24 is used for parasitic suppression.

4-38. TEST DATA. Pertinent references and applicable data for the driver amplifier are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram, Figure 5-26.

c. Driver Transformer Assembly 1A1A4, Schematic Diagram 5-25

d. Radio Frequency Amplifier AM-3924(P)/URT, Bottom View, Component Locations, Figure 5-8.

e. Driver Tube Assembly 1A1A1, Component and Test Point Locations, Figure 5-10.

f. Driver Transformer Assembly 1A1A4, Component and Test Point Locations, Figure 5-13.

g. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram, Figure 4-22.

h. Tube Socket Voltage and Resistance Measurements, Tables 5-2 and 5-3.

i. Driver Transformer Alignment Instructions, Paragraph 5-19.

j. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) Electronic Multimeter AN/USM-116

(3) Oscilloscope AN/USM-117

(4) Radio Test Set AN/TRM-3

(5) Signal Generator SG-582/U

4-39. FINAL AMPLIFIER.

4-40. GENERAL. The final amplifier (figure 4-4) consists of two electron tubes, an output transformer assembly, and various other parts. The function of this circuit is to linearly amplify the output from the driver amplifier to a level of 1 KW for application to an antenna.

4-41. CIRCUIT DESCRIPTION. The RF output from the driver amplifier is applied through parasitic suppressors R16 and R17 to the grid of electron tube V1 and through parasitic suppressors R18 and R19 to the grid of electron tube V2. The two parallel-connected electron tubes are operated class AB_1 during voice operation (class B during CW or FSK operation) to provide a nominal 25 DB of power gain. The class of operation is determined by the bias voltage applied by the bias power supply (paragraph 4-70). One of nineteen broadband output transformers is used to couple the RF output from the final amplifier to a 50 ohm transmission line.

4-42. The nineteen transformer assemblies are mounted on a motor-driven bandswitch assembly which is switched according to the operating frequency to automatically connect the correct transformer assembly into the signal path (paragraph 4-83). Each transformer assembly consists of a double tuned circuit which uses capacitive bottom coupling. In addition, the secondary winding is tapped such that the top of the secondary winding and the secondary tuning capacitor form a series resonant circuit to trap second harmonics.

4-43. The voltage drops developed across cathode resistor R25-R26 and R27-R28 are applied to the metering circuit for monitoring and measurement (paragraph 4-89) and to the overload circuit for monitoring (paragraph 4-77). Each of the power supply input lines (bias, plate, and screen) is filtered to provide RF decoupling. The voltage at the input to the final transformer assembly is also applied to the overload circuit for monitoring (paragraph 4-77). The cathode resistors are bypassed by capacitors C_D - C_C and C_A - C_B. The parallel connected resistors R5 and R6 provide grid loading to swamp the non-linear input impedance of the electron tubes, thus preventing distortion. Resistor R21 serves as a parasitic suppressor. Inductor L6 provides a low frequency bypass around resistor R21. Capacitors C10 and C20 are RF bypasses for the tube filament. Plugs P6 and P7 allow the screen voltages to be adjusted independently to balance the idling currents of the two tubes.

4-44. TEST DATA. Pertinent references and applicable test data for the final amplifier are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

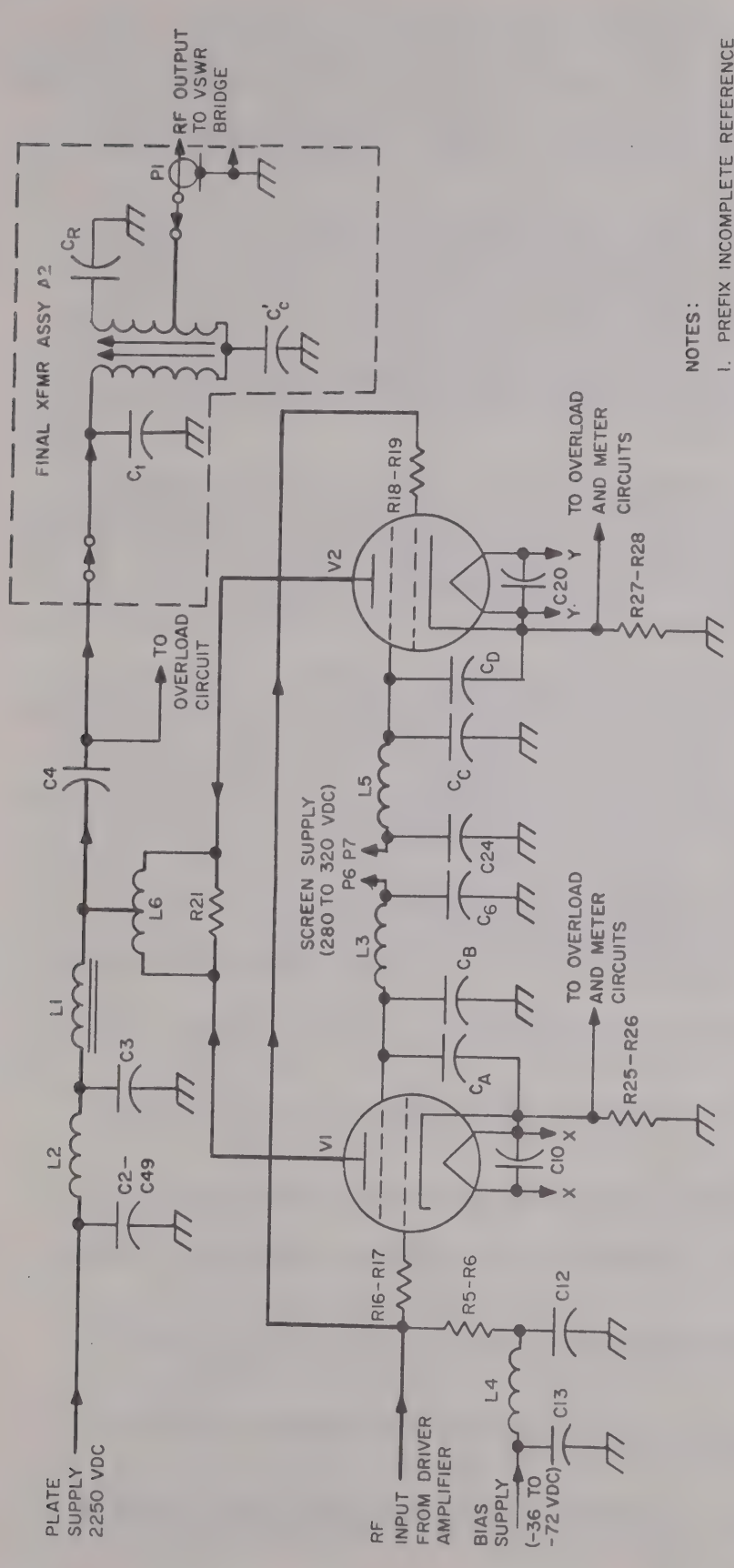
b. Final Transformer Assembly 1A1A2, Schematic Diagram, Figure 5-24

c. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

d. Final Amplifier Tube Socket Assembly, Bottom View, Component Locations, Figure 5-9.

e. Final Transformer Assembly 1A1A2, Component and Test Point Locations, Figure 5-11.

f. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram, Figure 4-22.



NOTES:

1. PREFIX INCOMPLETE REFERENCE DESIGNATIONS WITH 1A1
2. C_A CONSISTS OF THE FOLLOWING PARALLEL CONNECTED CAPACITORS C5, C8, C45, C46, C47, C48
3. C_B CONSISTS OF THE FOLLOWING PARALLEL CONNECTED CAPACITORS C15, C16, C26, C11, C21, C38
4. C_C CONSISTS OF THE FOLLOWING PARALLEL CONNECTED CAPACITORS C23, C32, C33, C34, C39, C40
5. C_D CONSISTS OF THE FOLLOWING PARALLEL CONNECTED CAPACITORS C9, C17, C41, C42, C43, C44

Figure 4-4. Final Amplifier, Simplified Schematic Diagram

g. Tube Socket Resistance Measurements, Table 5-4.

h. Final Transformer Alignment Instructions, Paragraph 5-20.

i. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) Electronic Multimeter AN/USM-116

(3) Oscilloscope AN/USM-117

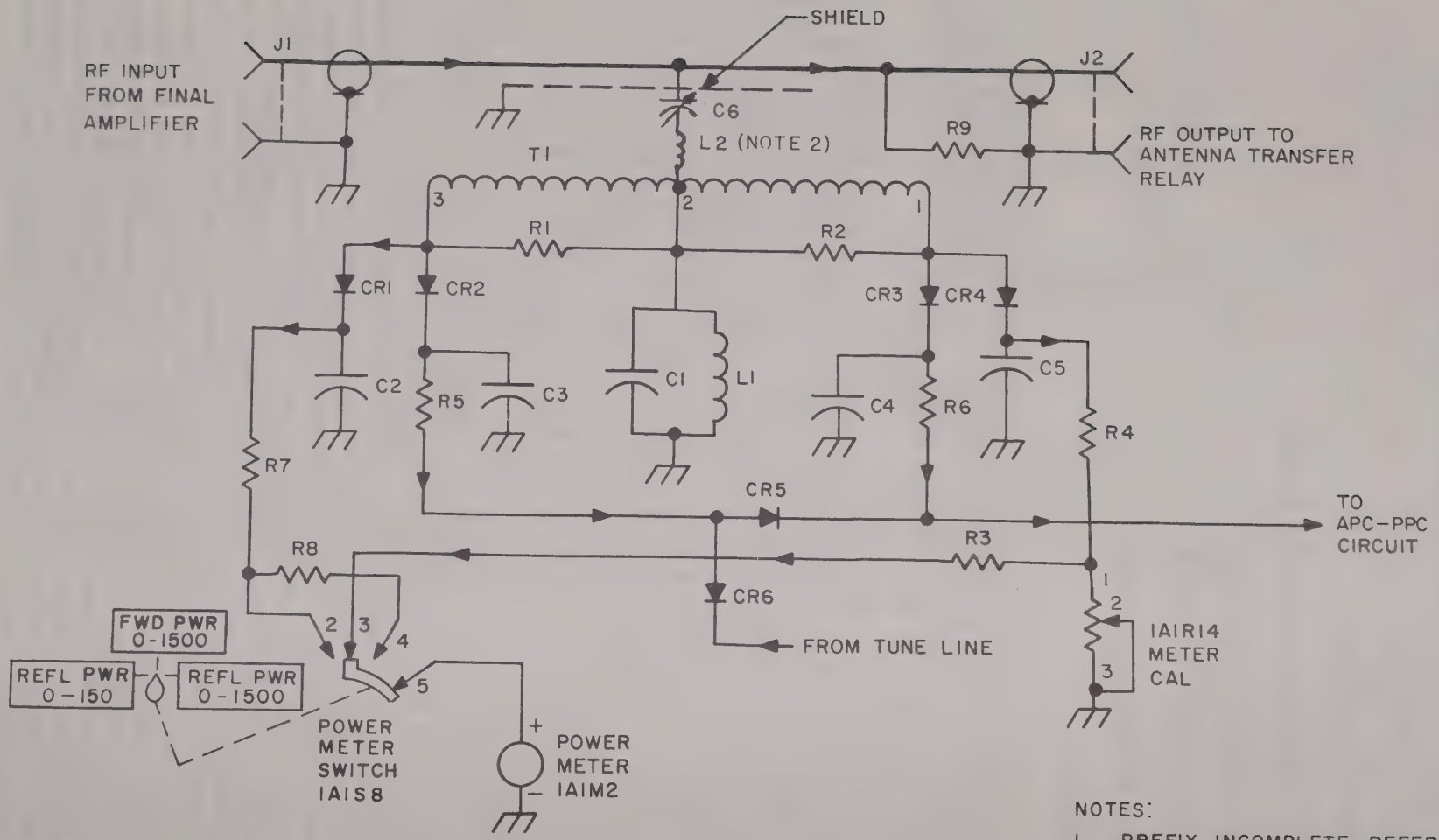
(4) Radio Test Set AN/TRM-3

(5) Signal Generator SG-582/U

4-45. VSWR BRIDGE.

4-46. GENERAL. The VSWR bridge (figure 4-5) consists of a toroidal transformer and various voltage divider, detector, and filter networks. The function of this circuit is to provide outputs for Power meter 1A1M2 proportional to the forward and reflected power on the output transmission line. In addition, a single output related to both reflected and forward power is applied to the APC-PPC circuits (paragraph 4-54).

4-47. CIRCUIT DESCRIPTION. The center conductor of the output transmission line passes through the center of toroidal transformer T1 and constitutes its single turn primary; the walls of the assembly serve as the shield for the transmission line. The short shield around the center conductor, grounded at only one end, does not serve as a part of the transmission line, but merely prevents undesired capacitive coupling between the center conductor and the secondary winding on the toroid. Current through the transmission line induces equal voltages in two parts of the center tapped secondary winding, one voltage being in phase with the line current and the other 180 degrees out of phase with the line current. Voltage divider C6-C1 provides a reference voltage at the center tap of toroidal transformer T1 that is in phase with the line voltage. When the load on the transmission line is resistive so that there is no reflected power, the line voltage and current are in phase. Trimmer C6 is adjusted so that the reference voltage is equal in magnitude to the induced voltage when the load on the transmission line is 50 ohms resistive. Therefore, the vector sum of the voltages between terminal 3 of transformer T1 (reflected power side of the bridge) and ground is zero, since the induced voltage is equal in magnitude and 180 degrees out of phase with the reference voltage. As the load changes to something other than 50 ohms resistive, causing reflected power on the line, the two voltages no longer exactly cancel and an output is produced at terminal 3 of transformer T1. This level is peak detected by diode CR1 and capacitor C2, and applied through calibrating resistor R7 to contact 2 of Power meter switch 1A1S8 and through calibrating resistor R8 to contact 4 of Power meter switch 1A1S8. Either range of reflected power can then be selected by the Power meter switch for application to Power meter 1A1M2 for measurement or monitoring. Similarly, the voltage at terminal 1 of transformer T1, the reference voltage and the induced voltage across resistor R2 add vectorially to produce a signal related to forward power. This voltage is peak detected by diode CR4 and capacitor C5, and applied to voltage divider R4-1A1R14. Potentiometer 1A1R14 allows the Power meter to be calibrated for a known amount of peak forward power (normally 1 KW). The output from the voltage divider is applied through calibrating resistor R3 to contact 3 of Power meter switch 1A1S8. Inductor L1 provides a DC path to ground from the center tap of toroidal transformer T1. Resistor R9 is a DC pull-down resistor to prevent the coupling capacitor in final transformer assembly 1A1A2 from holding a charge. At the high end of the frequency range, the leads of



NOTES:

1. PREFIX INCOMPLETE REFERENCE DESIGNATIONS WITH 1A1A3.
2. L2 IS INCLUDED IN ALL SERIAL NUMBERS EXCEPT A3 AND A4

Figure 4-5. VSWR Bridge, Simplified Schematic Diagram

capacitor C1 produce a small amount of inductive reactance. Therefore, inductor L2 is used to provide a corresponding amount of inductive reactance in series with capacitor C6 so that the output from divider C6-C1 will be frequency insensitive. Capacitors C2 and C5 are large to hold their charge between audio cycles, thus making the Power meter indicate PEP watts (most other transmitters indicate average power).

4-48. The signal at terminal 1 (forward power side) of transformer T1 is detected by diode CR3 and applied through isolating resistor R6 to the APC-PPC circuit. This output is, in essence, the envelope of the RF output from the AM-3924(P)/URT and is used to derive the automatic peak and average power control voltages (paragraph 4-54). Any output from the reflected power side of transformer T1 is detected by diode CR2 and applied through resistor R5 and diode CR5 to the APC-PPC circuit. The value of resistor R5 is chosen so that no control voltage will be generated by the APC-PPC circuit due to reflected power until the reflected power level reaches approximately 360 watts (4:1 VSWR at 1 KW forward power). As the VSWR, and therefore the reflected power, increases above this point, the additional input to the APC-PPC circuit results in an increased output from the APC-PPC circuit to reduce the output from the AM-3924(P)/URT. Therefore, the equipment is protected against over-dissipation that would result from excessive VSWR on the transmission line. When the tune line is grounded diode CR6 grounds out the bottom of resistor R5, preventing reflected power limitation during tuning. Diode CR5 also prevents resistor R6 from being shorted out.

4-49. TEST DATA. Pertinent references and applicable test data for the VSWR bridge are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. VSWR bridge 1A1A3, Components and Test Point Locations, Figure 5-12.

c. VSWR Bridge Adjustment Procedures, Paragraph 5-9.

d. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram, Figure 4-22.

e. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) Electrical Dummy Load DA-242/U

(3) Electronic Multimeter AN/USM-116

4-50. ANTENNA TRANSFER RELAY.

4-51. GENERAL. The Antenna transfer relay (figure 4-6) connects the antenna to the receiver input or the transmitter output depending on the condition of the system.

4-52. CIRCUIT DESCRIPTION. The 28 VDC output from the internal power supply is always present on one side of the coil of relay K1. The other side of the coil is connected to the system keyline. The system can be keyed (keyline grounded) from the T-827/URT, C-3698/URA-38, or with the AM-3924(P)/URT front panel Key switch. When the system is keyed, the RF output from the VSWR bridge is applied through connectors 1A1A3J2, P4, and P5, the contacts of relay K1, and connectors P6 and J3 to the antenna. Whenever the keyline is not grounded, the antenna is connected to receiver input connector J4 through connectors J3 and P6, the contacts on relay K1, and connector P7.

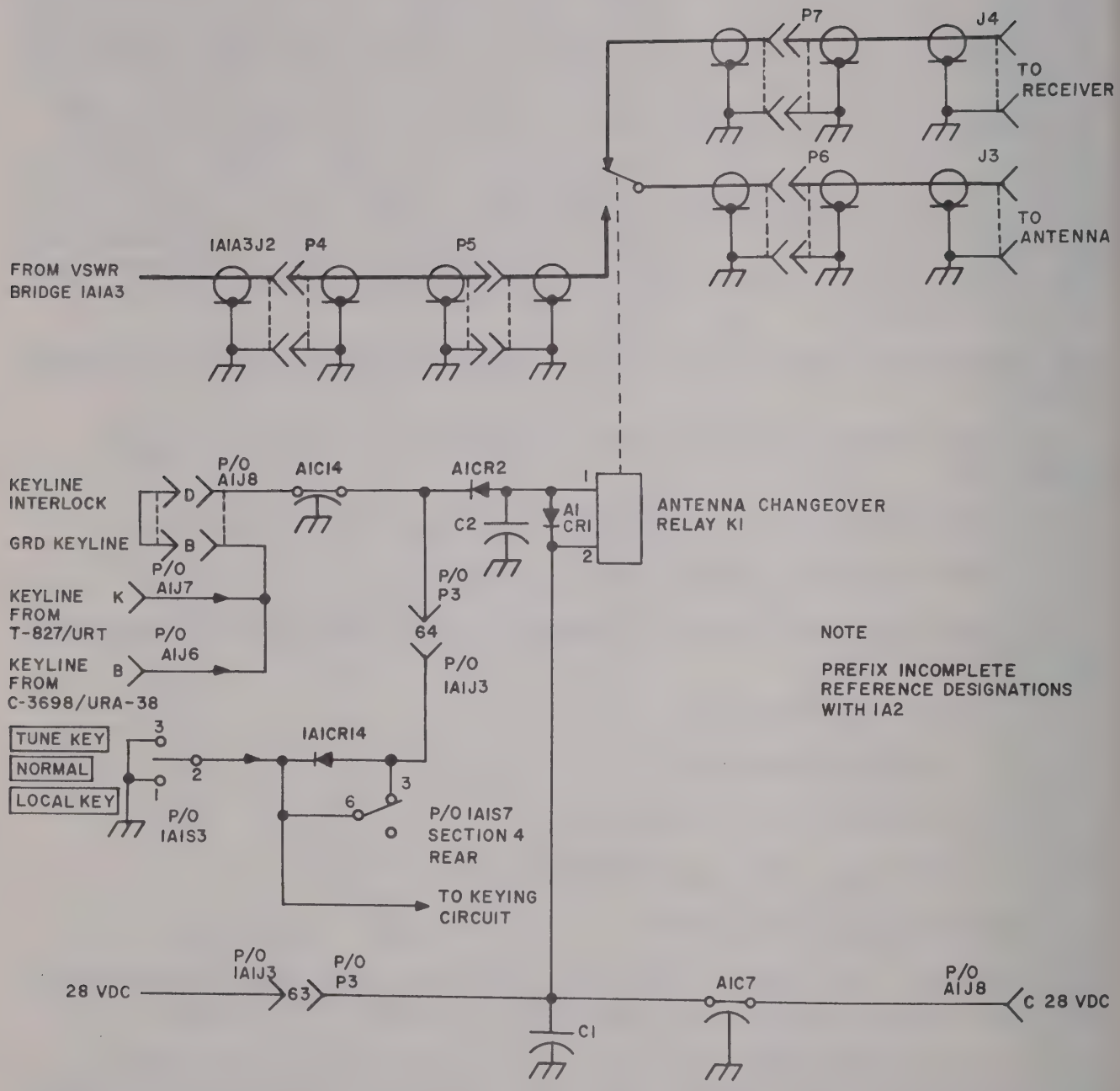


Figure 4-6. Antenna Transfer Relay, Simplified Schematic Diagram

4-53. TEST DATA. Pertinent references and applicable data for the antenna transfer relay are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram; Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram, Figure 5-26.

c. Radio Frequency Amplifier AM-3924(P)/URT, Case, Component Locations, Figure 5-17.

d. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

e. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram, Figure 4-22.

f. Required Test Equipment:

(1) Multimeter AN/PSM-4

4-54. APC-PPC CIRCUIT.

4-55. GENERAL. The APC-PPC circuit (figure 4-7) consists of twelve transistor stages. The function of this circuit is to generate control voltages that are applied to the T-827/URT (or used internally) to maintain the peak and average power levels of the RF output from the system at a constant predetermined value (normally 1 KW). Therefore, variations in system gain are compensated, preventing the RF output from decreasing below the rated level or exceeding a safe limit. The control voltages are drived from an output from VSWR bridge 1A1A3 (paragraph 4-45). This output is, in essence, the envelope of the RF output from the AM-3924(P)/URT.

4-56. CIRCUIT DESCRIPTION. The output from VSWR bridge 1A1A3 is developed across a voltage divider consisting of resistors 1A1A3R6, R25, R23, 1A1R13, and transistor Q7. During normal operation, shunt attenuator Q7 is turned on, connecting resistors R23 and 1A1R13 in parallel with resistor R25. This reduces the output from the VSWR bridge prior to application to the APC and PPC detectors. PWR control 1A1R13 is normally set maximum clockwise (minimum resistance). Therefore, the input to the APC and PPC detectors can be increased by inserting some resistance in series with resistor R23. When the system is placed in a tune condition, shunt attenuator Q7 is turned off (paragraph 4-62) allowing the full output from the VSWR bridge to be applied to the detectors. This increased input allows the detectors to be activated at a lower RF output to constrain the RF power output to a lower level for tuning an antenna coupler.

4-57. Threshold detector Q8 is turned on when the output from the attenuator exceeds the voltage developed across emitter resistor R26 by threshold reference Q11. The threshold level developed by threshold reference Q11 is adjusted (PPC ADJ 1A1R11) at the time of installation to a level which prevents threshold detector Q8 from turning on until its input represents 1 KW of RF output power. The output from threshold detector Q8 is raised in level by amplifier Q9 and applied through emitter follower Q10 and gate CR22 (when closed, see paragraph 4-60) to the T-827/URT PPC circuits. Diode CR11 provides temperature compensation for amplifier Q9. Emitter follower Q10 provides a low impedance source to drive the lines to the T-827/URT.

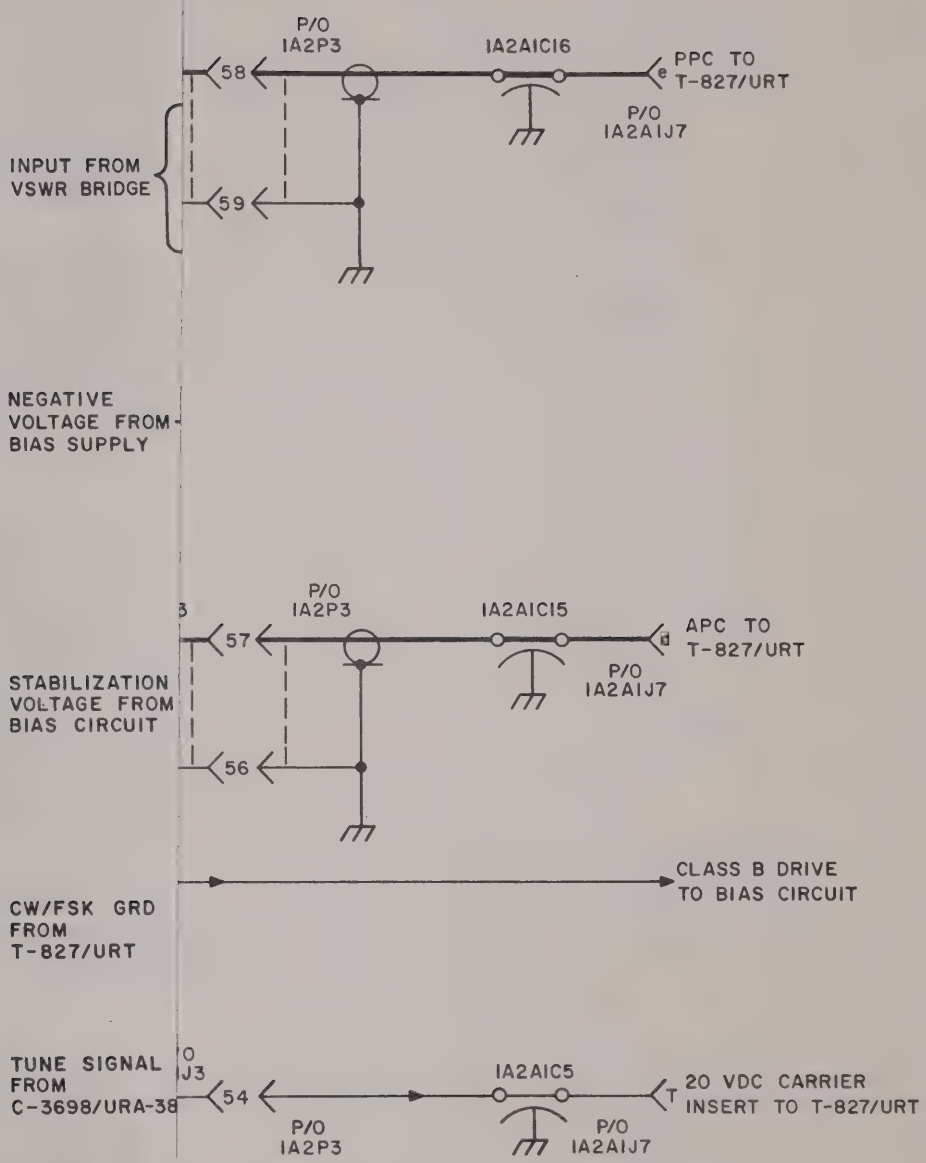


Figure 4-7. APC-PPC Circuit, Simplified Schematic Diagram

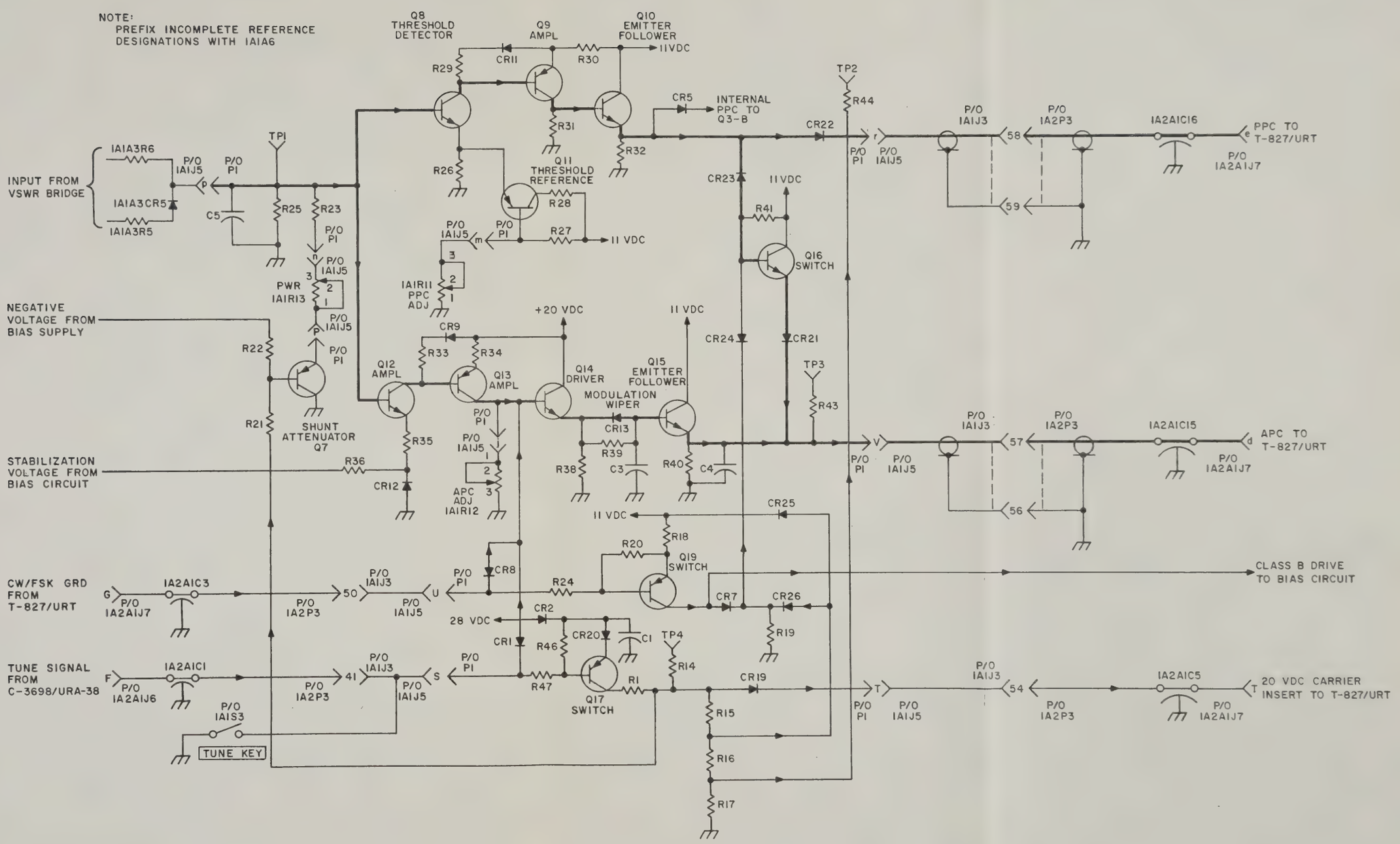


Figure 4-7. APC-PPC Circuit, Simplified Schematic Diagram

4-58. Amplifiers Q12 and Q13 and driver Q14 provide an amplified, low impedance duplicate of the output from the attenuator circuit which is applied to the modulation wiper. Diodes CR12 and CR9 are used to temperature compensate amplifiers Q12 and Q13, respectively. Thus, the stability of the amplifier circuits is greatly improved. The function of the modulation wiper is to average the peaks of the applied signal to produce a DC output which is proportional to the average power output from the system. Capacitor C3 charges through resistor R39 and discharges through resistor R38 and diode CR13. The discharge time constant is chosen to be somewhat shorter than the charging time constant; otherwise the voltage at capacitor C3 would tend to rise with complex waveforms and given an erroneously high indication of average power. Emitter follower Q15 provides a low impedance source for the following circuits. In conjunction with capacitor C4, emitter follower Q15 provides a fast-rise, slow-fall signal for application to the T-827/URT. At the time of installation, the gain of amplifier Q13 is adjusted with APC ADJ 1A1R12 to control the compatible AM carrier at 250 watts.

4-59. During voice operation (all modes except CW and FSK) the PPC and APC outputs are applied to the T-827/URT to control the peak and average levels of the system RF power output. During CW and FSK operation, the PPC circuits of the T-827/URT are not used. However, it is desired to preserve the rapid response and precise level sensing characteristics of the AM-3924(P)/URT PPC detector. Therefore, the CW/FSK ground produced by the T-827/URT is used in the AM-3924(P)/URT to switch the PPC voltage to the APC circuits.

4-60. During voice operation, the 11 VDC at the collector of switch Q16 is dropped across a voltage divider consisting of R41, CR24, and R19, producing approximately 2 VDC at the base of switch Q16. During normal operation, both the APC and PPC control voltages exceed this 2 VDC level. Therefore, both gate CR23 and switch Q16 will be reverse biased, allowing the outputs from the APC and PPC circuits to be applied to their respective circuits in the T-827/URT. When the T-827/URT is placed in a CW or FSK mode of operation, a ground is applied through diode CR8 to turn off the APC circuits. In addition, the CW/FSK ground is applied to the base circuit of switch Q19, energizing it. The resulting positive output from switch Q19 opens (reverse biases) the normally closed gate CR24, and changes the bias on the final amplifier tubes (paragraph 4-70) for class B operation. Now the 11 VDC at the collector of switch Q16 is dropped across voltage divider R41-CR23-R32, resulting in approximately 2 VDC at the base of switch Q16. Since the APC circuit is deenergized, switch Q16 is forward biased and the 2 VDC is applied to the APC output to the T-827/URT. Since gate CR23 is closed (forward biased) and PPC generated will increase the conduction of switch Q16; therefore, the PPC signal is applied to the APC line by emitter follower action.

4-61. Whenever normal power control is inoperative (either because of failure in the T-827/URT or because of the use of an exciter without power control capabilities), the PPC voltage will continue to rise in an effort to reduce the exciter output power. When the PPC voltage rises sufficiently, diode CR5 starts to turn off the internal PPC circuit (transistor Q3 in the bias supply, see paragraph 4-70) to increase the bias on the driver amplifier tubes, and thus reduce the RF power output to the desired level. Therefore, the AM-3924 (P)/URT is always protected against excessive dissipation in the amplifier tubes and transformer assemblies.

4-62. When a low power RF signal is required for tuning an antenna coupler, the tune line is grounded either automatically by the C-3698/URA-38 or by the front panel TUNE KEY switch. In either case, the ground turns off the APC circuits (through gate CR1) and turns

on switch Q17, resulting in the +40 VDC generated by diode CR2 and capacitor C1 being applied to voltage divider R1-R15-R16-R17, producing four results:

a. The base voltage on shunt attenuator Q7 is raised sufficiently to cut it off, allowing the full output from the VSWR bridge to be applied to the PPC circuit. As a result, the generation of PPC voltage starts at a lower level of RF power output. As shipped, the value of resistor R25 is chosen such that a 200 watt RF output from the system is available for tuning. If desired, the value of resistor R25 can be changed (paragraph 2-35) to provide a tune power level other than 200 watts. Thus, the tune power requirements of any antenna coupler can be satisfied by changing the value of a single resistor.

b. In order to provide a single continuous tone on which to tune the antenna coupler, 20 VDC is applied through diode gate CR19 to the T-827/URT causing the carrier to be reinserted into the RF output.

c. The positive level developed across resistors R16 and R17 is applied through diode gate CR26 to resistor R19. This opens gate CR24, closes gate CR23, and energizes switch Q16 to switch the PPC control voltage to the APC circuits as was explained in paragraph 4-60. The PPC circuit is used due to the rapid sensitive response to power beyond a specific point (as contrasted with the APC circuits), but is applied to the T-827/URT APC circuits because the PPC circuits in the exciter are not capable of controlling carrier level.

d. The positive level across resistor R17 (approximately 9 VDC) is applied to the T-827/URT PPC circuits. This signal cuts off the T-827/URT PPC circuits, preventing leakage of any sideband modulation that may be present.

Diode CR20 ensures positive cutoff of switch Q17. Diode CR25 prevents the voltage across resistors R16 and R17 from rising above 11 VDC when tune power is called for during an FSK or CW mode of operation.

4-63. TEST DATA. Pertinent reference and applicable test data for the APC-PPC circuit are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram, Figure 5-26.

c. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

d. Radio Frequency Amplifier AM-3924(P)/URT, Case, Component Locations, Figure 5-17.

e. Printed Circuit Board Assembly 1A1A6, Component and Test Point Locations, Figure 5-15.

f. APC-PPC circuit, Servicing Block Diagram, Figure 4-23.

g. System Alignment, Paragraph 2-34.

h. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) Electronic Multimeter AN/USM-116

(3) Oscilloscope AN/USM-117

(4) PC Board Extenders (Paragraph 5-44)

i. Transistor DC Voltage Measurements, Table 5-5.

4-64. KEYING CIRCUIT.

4-65. GENERAL. The keying circuit (figure 4-8) consists of a key interlock, a key driver, a keying stage, a 28 VDC switch, and various gates and switches. The function of this circuit is to cause the bias power supply to provide operate bias to the four electron tubes whenever the system keyline is grounded, unless an overload exists, a tuning motor is energized, or the AN/URA-38 interlocks the keyline, in which case cutoff bias is maintained.

4-66. CIRCUIT DESCRIPTION. When the AM-3924(P)/URT is keyed, ground is applied to the cathode of diode CR11. Therefore, voltage divider R12-R28-R16 drops the voltage at the base of key driver Q5 below that produced by voltage divider R13-R14 at the emitter, turning on key driver Q5 and thus keyer Q6. Keyer Q6 functions as a switch to short out resistor R8 in the bias circuit (paragraph 4-70).

4-66a. Some of the circuits connected to the system keyline (the T/R relays) are connected to an unfiltered full-wave rectified 28 VDC line whose voltage drops instantaneously to zero 120 times per second. To prevent these momentary grounds from keying the AM-3924(P)/URT at a 120 CPS rate, an integrating network (R16 and C1) is used. The network also provides a delay when initially keyed to allow any exciter keying transients to collapse before the amplifier reaches full gain. Diode CR11 prevents the voltage at the base of transistor Q5 from rising above 11 volts when unkeyed. When FREQUENCY MC switch 1A1S7 is not set at AUTOMATIC, diode 1A1CR14 prevents the AM-3924(P)/URT from being keyed from the system keyline; in this condition the AM-3924(P)/URT can be keyed only with Key switch 1A1S3.

4-67. 28 VDC switch Q8-Q9 consists of two cascaded emitter followers which supply 28 VDC to the T/R relays in the T-827/URT (NAVSHIPS 0967-032-0010). However, if the tuning motor is energized or the ground keyline interlock signal from the AN/URA-38 is present, the cathode of diode gate CR17 is grounded. This turns off 28 VDC switch Q8-Q9, preventing the T-827/URT from being keyed.

4-68. A ground keyline interlock input from the AN/URA-38 or a ground input from the tuning circuit (paragraph 4-83) lowers the voltage at the base of key interlock Q4 by virtue of divider R11-R10. This saturates key interlock Q4, preventing key driver Q5 from conducting even if the keyline is grounded. In addition, a key interlock signal is supplied through diode CR12 to the bias power supply to cut off PPC amplifier 1A1AQ6 (paragraph 4-75). Thus, for both of these reasons the AM-3924(P)/URT can not be keyed. If an overload occurs, the overload circuit turns transistor Q4 on through resistor R5 and diode CR5, again preventing keying of the set so long as the overload circuit is latched up. Key interlock Q4 is also energized when the Overload switch is set at RESET, so the unit can not be forced to operate under overload conditions by holding the Overload switch in the RESET position. Diode CR9 drops the bias needed to turn on transistor Q4 by an additional 0.3

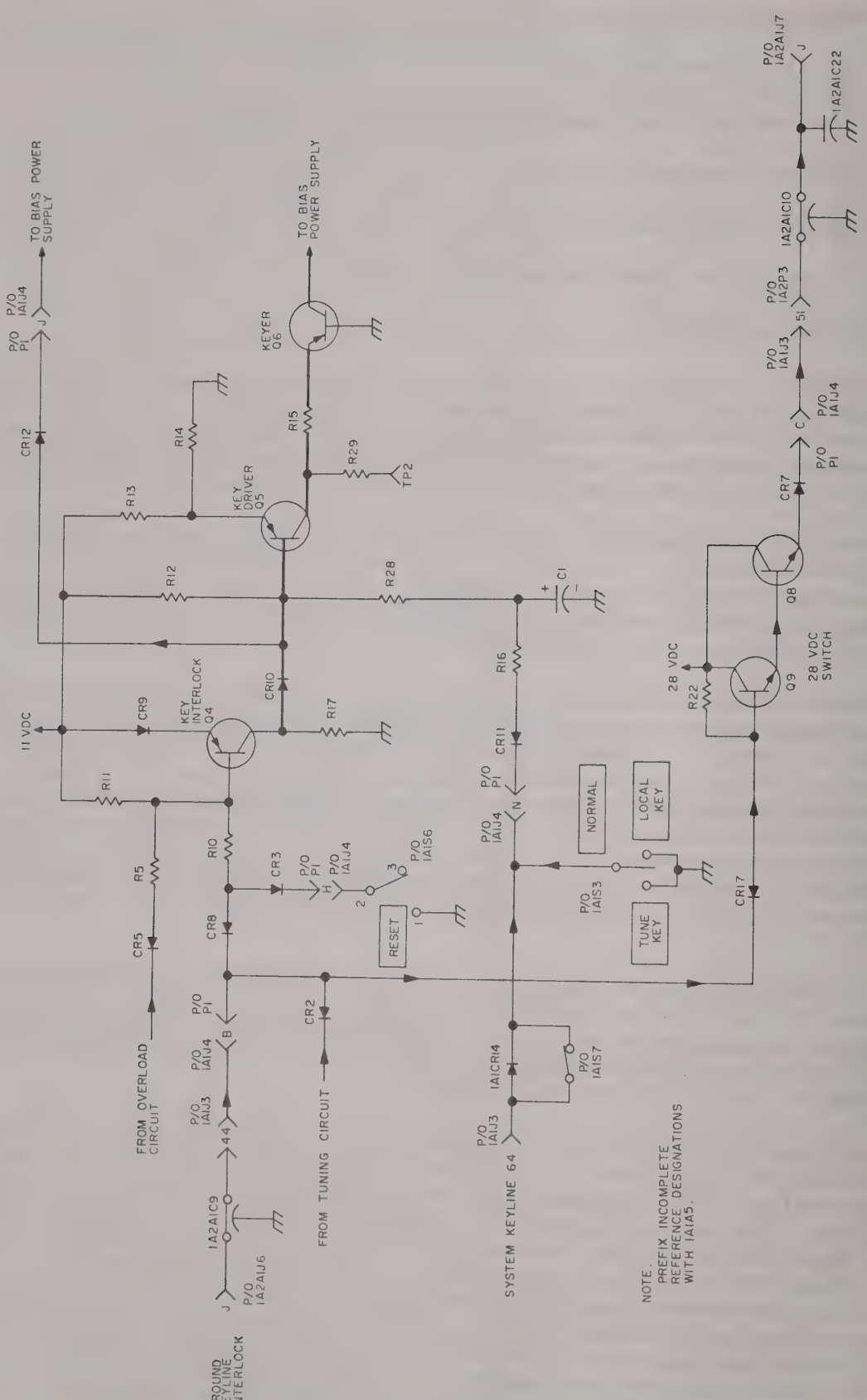


Figure 4-8. Keying Circuit, Simplified Schematic Diagram

volts below 11 volts, ensuring that transistor Q4 will be solidly cut off until one of the key interlock inputs is energized.

4-69. TEST DATA. Pertinent references and applicable test data for the keying circuit are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

c. Printed Circuit Board 1A1A5, Component and Test Point Locations, Figure 5-14.

d. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram, Figure 4-22.

e. System Keying and Key Interlock Circuitry, Servicing Block Diagram, Figure 4-27.

f. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) PC Board Extender (paragraph 5-44)

g. Transistor DC Voltage Measurements, Table 5-5.

4-70. BIAS POWER SUPPLY.

4-71. GENERAL. The bias power supply (figure 4-9) consists of a full-wave bridge rectifier and filter, a voltage regulator and divider, and various switching circuits. The function of this circuit is to provide the required grid bias voltages for operation of the electron tubes. Until the system is keyed, the outputs from the bias power supply are at the correct level to bias the electron tubes beyond cutoff. When the system is keyed, the bias voltages change to the values required to establish proper plate currents in the electron tubes according to the mode of operation. That is, the final amplifier bias is changed to the value required for class AB_1 operation of the tubes during voice operation or to the value required for class B operation during CW or FSK operation. The value of driver bias is such that the tubes operate class A. However, the driver bias can be controlled by the PPC circuit according to the AM-3924(P)/URT RF power output requirements (internal PPC).

4-72. CIRCUIT DESCRIPTION. The output from winding 20-21 of transformer 1A1T1 is full-wave rectified by diodes CR14 through CR17, filtered by capacitor 1A1C29, and applied to a voltage regulator and divider circuit consisting of current limiting resistor R42, Zener diodes CR4 and CR3, and resistor R8. When the system is keyed, transistor 1A5Q6 of the keying circuit (paragraph 4-64) shorts out resistor R8, grounding the bottom side of the voltage regulator. In any mode of operation, except CW and FSK, switch Q20 is conducting into saturation, connecting the bottom of PA BIAS potentiometer 1A1R10 to -36 volts. Therefore, PA BIAS control 1A1R10 can be adjusted over the normal class AB_1 range of operating bias for the final amplifier tubes. The output from PA BIAS control 1A1R10 is applied through transistor Q21 to the final amplifier tubes by emitter follower action. During CW or FSK operation, a positive output from the APC-PPC circuit (paragraph 4-54) turns switch Q20 off. Due to the high collector-emitter impedance of transistor Q20 in this condition, the adjustment range of the PA BIAS control is insignificant,

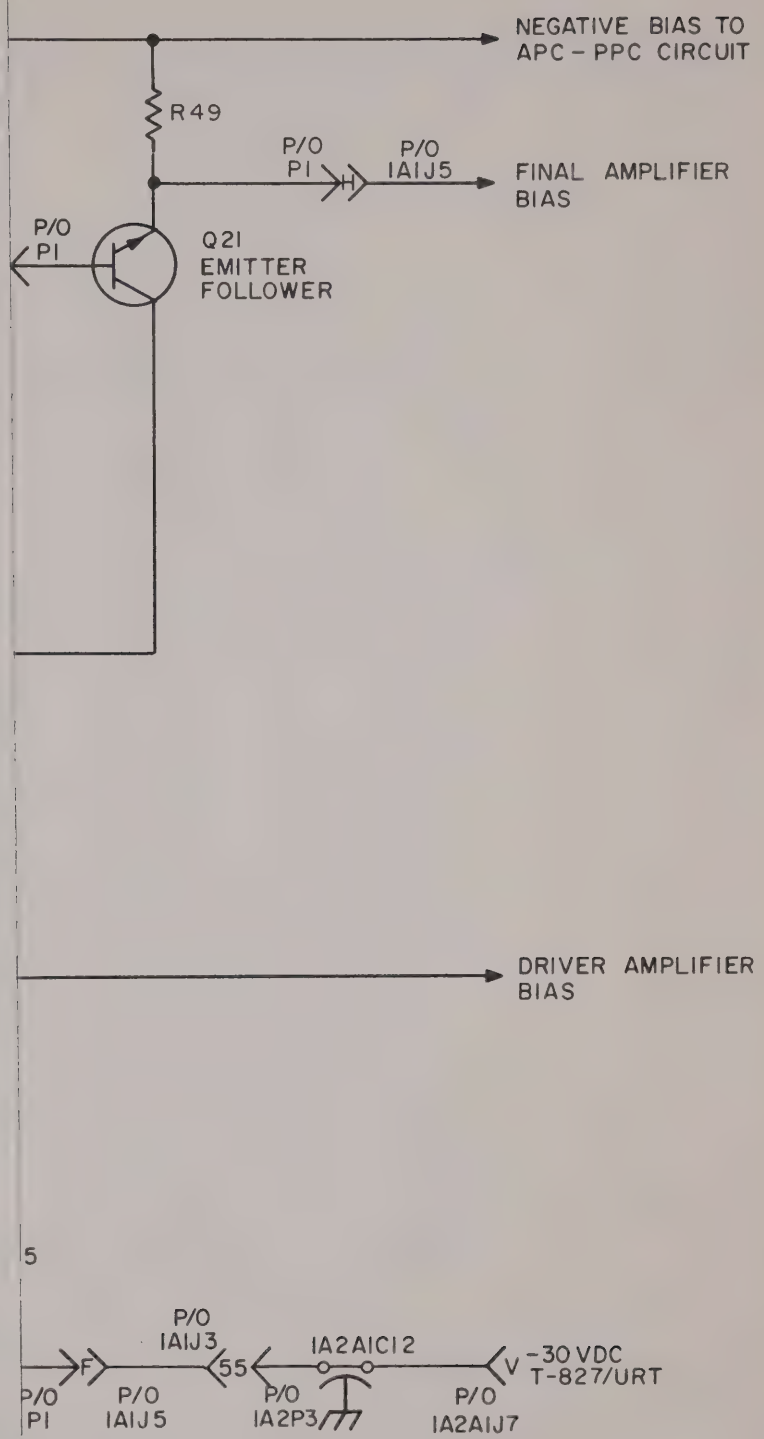


Figure 4-9. Bias Circuit, Simplified Schematic Diagram

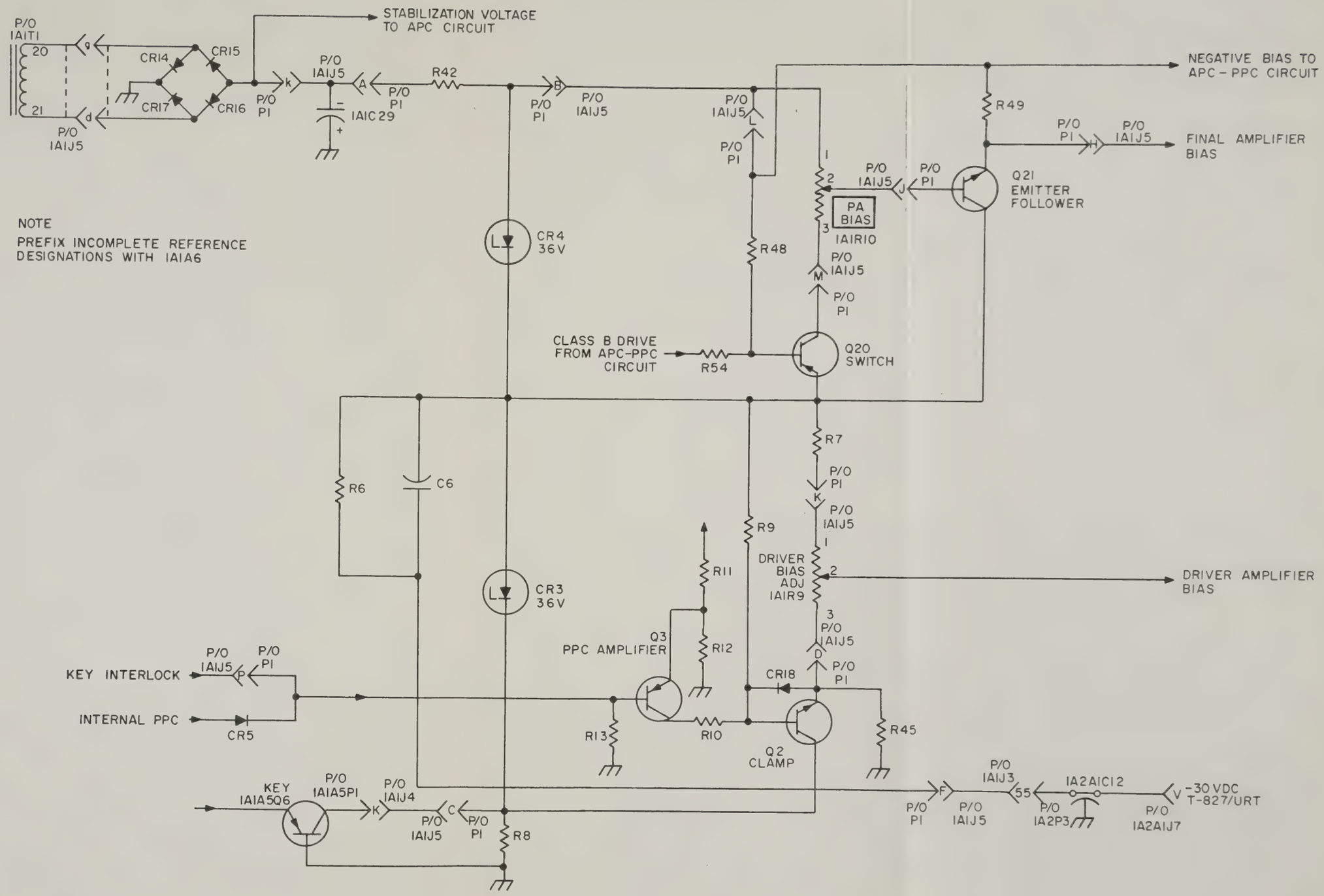


Figure 4-9. Bias Circuit, Simplified Schematic Diagram

essentially causing the full output from the regulator-divider circuit (-72 volts) to be applied by the emitter follower action of transistor Q21 to the final amplifier tubes. Emitter follower Q21 is used to allow grid current to be drawn by the amplifier tubes without losing regulation. That is, during class B operation, a larger amount of drive is required in order to obtain the rated output from the AM-3924(P)/URT. This can result in a small amount of grid current. If emitter follower Q21 were not used, this current would create a voltage drop across PA BIAS control 1A1R10, thus destroying the regulation and biasing the tubes further toward cutoff. However, with emitter follower Q21 in the circuit, the grid current is now drawn through the small collector-emitter resistance of the transistor resulting in essentially no shift of the bias voltage.

4-73. During normal operation with the T-827/URT, PPC amplifier Q3 is conducting sufficiently to turn on clamp Q2 into saturation. Therefore, the one end of driver bias adj 1A1R9 is clamped to ground through transistors Q2 and 1A5Q6. In this condition, the potentiometer can be adjusted over the normal range of class A operating bias for the driver amplifier electron tubes (0 to -24 VDC).

4-74. When the system is not keyed, the short is removed from across resistor R8. The voltage drop that appears across the resistor in this condition drives the bias voltages for the four electron tubes into the cutoff region. Thus, the AM-3924(P)/URT is keyed on and off through the bias voltages applied to the four electron tubes. Resistor R45 is a pull-down resistor which prevents the cutoff bias applied to the driver tubes from exceeding the grid-to-cathode voltage rating.

4-75. Normally, the APC-PPC output to the T-827/URT maintains the output power at 1 KW (paragraph 4-54). However, if there is a failure in the T-827/URT APC-PPC circuits, the PPC voltage will rise beyond its normal level in an attempt to reduce the output power. This increasing level is applied through isolation diode CR5 to gradually cut off PPC amplifier Q3. As the voltage at the collector of PPC amplifier Q3 falls (becomes more negative), so also does the base voltage of clamp Q2. By emitter follower action, then, the voltage at the bottom of Driver Bias Adj potentiometer 1A1R9 also falls, reducing the gain of the driver tubes until proper power output is obtained. Diode CR18 keeps any reverse base-to-emitter voltage at clamp Q2 from exceeding safe limits. If an overload occurs, or the tuning motor is energized, the keying circuit produces a key interlock signal (paragraph 4-64) that is applied to the base of PPC amplifier Q3. This cuts off transistor Q3, and clamp Q2. Therefore, the driver electron tubes will be biased at cutoff preventing operation until tuning is complete or the reason for the overload is removed. Resistor R6 and Capacitor C6 determine the amplitude and duration of the negative pulse applied to the -30 VDc lead to the T-827/URT to suppress turn-on transients when the exciter is keyed (NAVSHIPS 0967-032-0010).

4-76. TEST DATA. Pertinent references and applicable data for the bias power supply are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

c. Printed Circuit Board 1A1A6, Component and Test Point Locations, Figure 5-15.

d. Driver Bias Adjustment Procedure, Paragraph 5-5.

e. Radio Frequency Amplifier AM-3924(P)/URT, DC power Control, Servicing Block Diagram Figure 4-24.

f. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) PC Board Extender (Paragraph 5-44)

g. Transistor DC Voltage Measurements, Table 5-5.

4-77. OVERLOAD CIRCUIT.

4-78. GENERAL. The overload circuit (figure 4-10) consists of an overload detector, a 20 VDC switch, and various gates, switches, and indicators. The function of this circuit is to monitor the cathode current of the two final amplifier tubes, the RF output voltage from the final amplifier tubes, the flow of cooling air, and the temperature of the PP-3916/UR. If any of these are abnormal the overload circuit trips, unkeying the system and energizing an indicator lamp and alarm to provide visual and audible indication of the overload condition. The circuit can be reset by a front panel switch.

4-79. CIRCUIT DESCRIPTION. Four inputs to the circuit are used to monitor for an overload condition as follows:

a. The RF output voltage from the plates of the final amplifier tubes is sampled by capacitive voltage divider C35-C36, detected by diode CR13, and developed across base resistor A5R8. Resistor R20 completes the DC path for diode CR13. Capacitor C37 is an RF bypass capacitor.

b. The voltage developed across the cathode resistor for final amplifier tube V1 is applied to base resistor A5R8 through RF decoupling network R7-C27-A5C5 and OR gate A5CR15.

c. The voltage developed across the cathode resistor for final amplifier tube V2 is applied to base resistor A5R8 through RF decoupling network R8-C28-A5C4 and OR gate A5CR16.

d. When the temperature of the PP-3916/UR is within safe limits and cooling air is being circulated through the AM-3924(P)/URT, ground is applied through the thermal switch in the PP-3916/UR, interlock switch S9, and air vane switch S1 to the cathode of diode A5CR13. Therefore, the full 20 VDC applied to resistor R21 is dropped across that resistor. If the thermal switch in the PP-3916/UR opens (temperature overload), if the cover is removed from the final amplifier (opening interlock switch S9), or if air vane switch S1 opens (air flow interrupted), the ground path to the cathode of diode A5CR13 is broken. This allows part of the 20 VDC to be developed across base resistor A5R8 through OR gate A5CR14.

4-80. When the voltage on any one of the input lines exceeds the threshold voltage developed by resistors A5R6 and A5R7, overload detector A5Q3 is forward biased. This turns on 20 VDC switch A5Q2. Transistor A5Q3 also draws enough current from the keying circuit through isolating diode A5CR5 to energize the key interlock circuit (paragraph 4-68) to prevent keying of the set. Diode A5CR5 prevents key interlock signals from tripping the overload circuit. Resistor A5R3 maintains 20 VDC switch A5Q2 cut-off when overload detector A5Q3 is not energized. When 20 VDC switch A5Q2 energizes, overload detector A5Q3 is locked on through diode A5CR6. Also, 20 VDC is applied through diode A5CR32

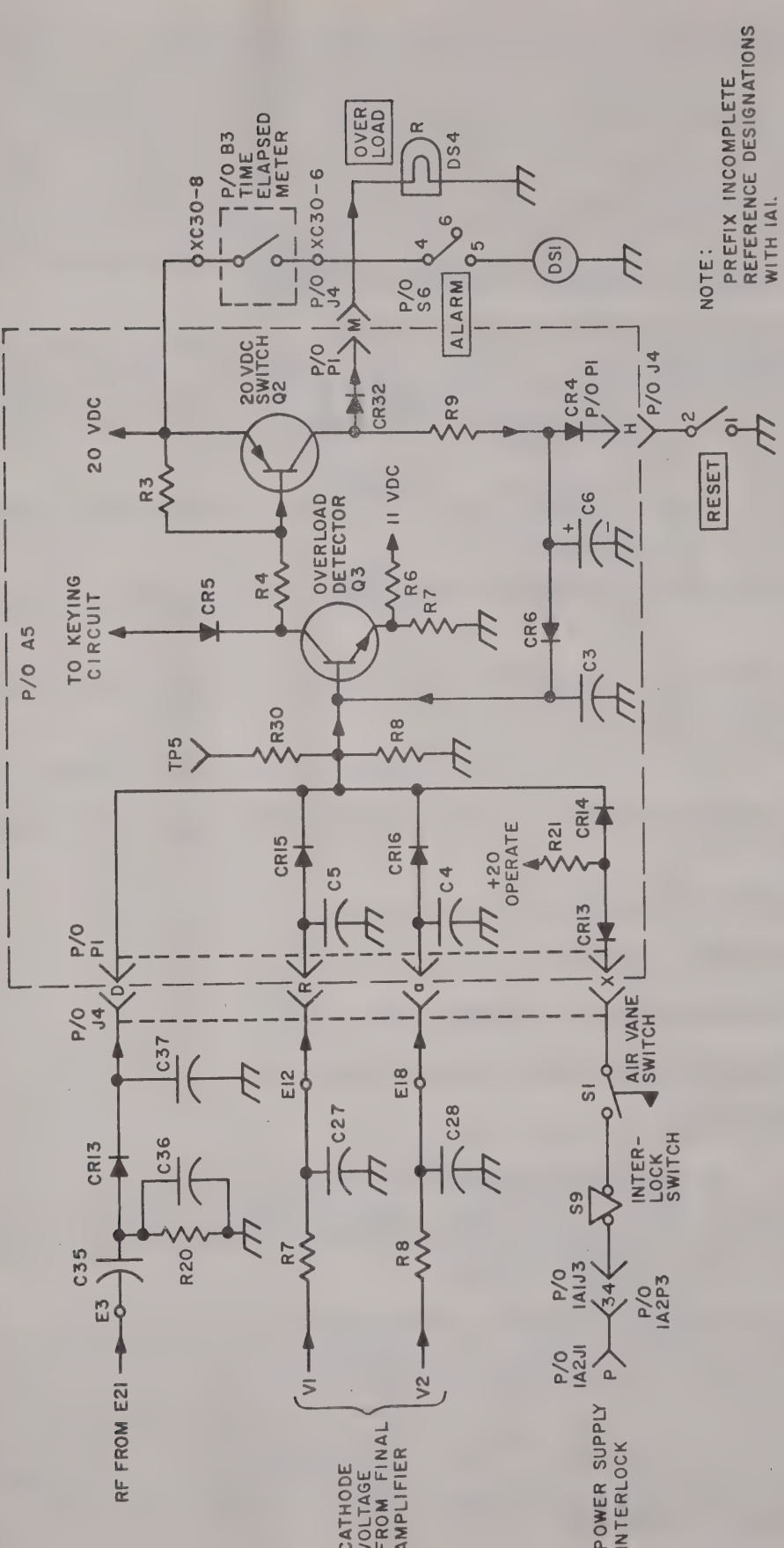


Figure 4-10. Overload Circuit, Simplified Schematic Diagram

to OVERLOAD indicator lamp DS5 and through switch S6 (when set at ALARM) to overload alarm DS1. This energizes both the alarm and indicator, providing both visual and audible indication that an overload exists. Resistor A5R9 and capacitor A5C6 provide a millisecond delay in the latching of the circuit allowing extremely short overloads to pass without unkeying the system. Once energized, the overload circuit will remain or until primary power is removed or Overload switch S6 is momentarily set at RESET. When Overload switch S6 is set at RESET, clamp A5CR6 is disabled. If the overload was of a momentary nature, the overload circuit will be reset, releasing the key interlock and allowing operation to be resumed. However, if the overload remains the circuit will again pick up and prevent operation until the overload is located and removed.

4-81. When the time elapsed meter reaches 1000 hours, its contacts close, applying 20 VDC to the OVERLOAD indicator and alarm. This serves as a reminder that the electron tubes should be checked for possible replacement. However, since diode A5CR32 is now reverse biased, overload detector A5Q3 will not be turned on and normal keying of the set will not be inhibited.

4-82. TEST DATA. Pertinent references and applicable test data for the overload circuit are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

c. Printed Circuit Board 1A1A5, Component and Test Point Locations, Figure 5-14.

d. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram, Figure 4-22.

e. Required Test Equipment:

(1) Multimeter AN/PSM-4

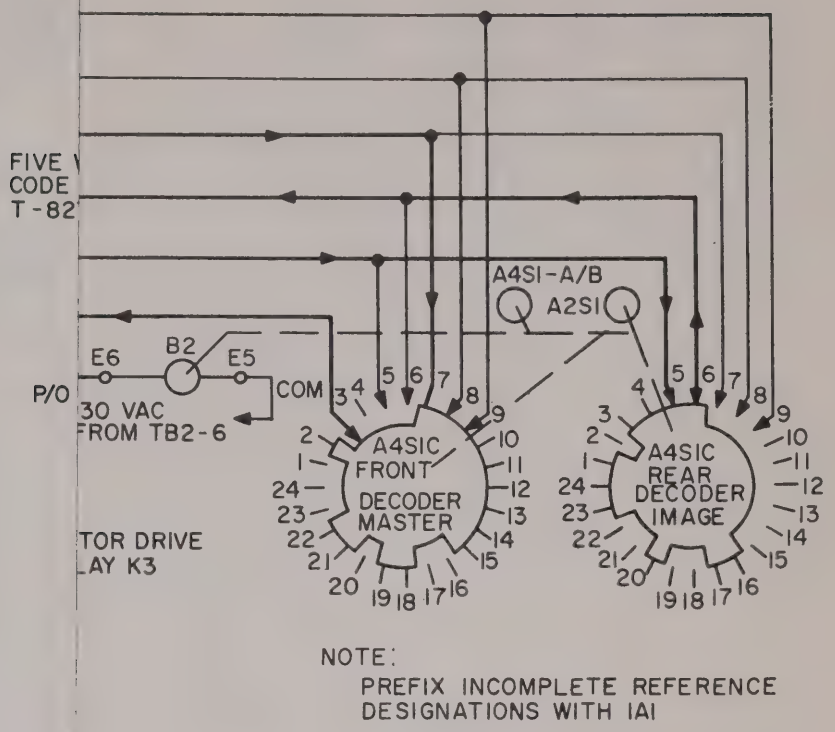
(2) PC Board Extender (Paragraph 5-44)

f. Transistor DC Voltage Measurements, Table 5-5.

4-83. TUNING CIRCUIT.

4-84. GENERAL. The tuning circuit (figure 4-11) consists of a decoder, an encoder, two bandswitches, a motor, a motor relay, and a gating circuit. The function of this circuit is to automatically position the bandswitches in the final and driver transformer assemblies according to the selected operating frequency.

4-85. CIRCUIT DESCRIPTION. An open-seeking circuit that employs a five-wire coding scheme is used to automatically position the bandswitch assemblies in the driver and final transformer assemblies according to the selected operating frequency (paragraphs 4-33 and 4-39). Nineteen bands are used to cover the 2.0 to 30.0 MC frequency range, and thus nineteen different five-wire codes are required for tuning (Table 4-1). The code is generated either externally (FREQUENCY MC switch S7 set at AUTOMATIC) by an encoder in the T-827/URT or internally by an encoder deck in switch S7 (FREQUENCY MC switch S7 set at one of the nineteen MC positions). In either case, a series of opens and grounds is



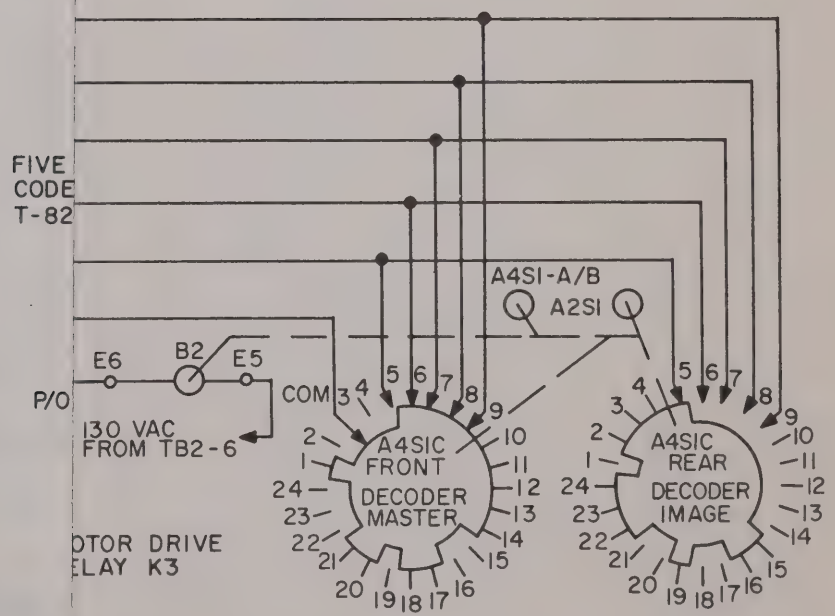


Figure 4-11. Tuning Circuit, Simplified Schematic Diagram

to OVERLOAD indicator lamp DS5 and through switch S6 (when set at ALARM) to overload alarm DS1. This energizes both the alarm and indicator, providing both visual and audible indication that an overload exists. Resistor A5R9 and capacitor A5C6 provide a millisecond delay in the latching of the circuit allowing extremely short overloads to pass without unkeying the system. Once energized, the overload circuit will remain or until primary power is removed or Overload switch S6 is momentarily set at RESET. When Overload switch S6 is set at RESET, clamp A5CR6 is disabled. If the overload was of a momentary nature, the overload circuit will be reset, releasing the key interlock and allowing operation to be resumed. However, if the overload remains the circuit will again pick up and prevent operation until the overload is located and removed.

4-81. When the time elapsed meter reaches 1000 hours, its contacts close, applying 20 VDC to the OVERLOAD indicator and alarm. This serves as a reminder that the electron tubes should be checked for possible replacement. However, since diode A5CR32 is now reverse biased, overload detector A5Q3 will not be turned on and normal keying of the set will not be inhibited.

4-82. TEST DATA. Pertinent references and applicable test data for the overload circuit are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

c. Printed Circuit Board 1A1A5, Component and Test Point Locations, Figure 5-14.

d. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram, Figure 4-22.

e. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) PC Board Extender (Paragraph 5-44)

f. Transistor DC Voltage Measurements, Table 5-5.

4-83. TUNING CIRCUIT.

4-84. GENERAL. The tuning circuit (figure 4-11) consists of a decoder, an encoder, two bandswitches, a motor, a motor relay, and a gating circuit. The function of this circuit is to automatically position the bandswitches in the final and driver transformer assemblies according to the selected operating frequency.

4-85. CIRCUIT DESCRIPTION. An open-seeking circuit that employs a five-wire coding scheme is used to automatically position the bandswitch assemblies in the driver and final transformer assemblies according to the selected operating frequency (paragraphs 4-33 and 4-39). Nineteen bands are used to cover the 2.0 to 30.0 MC frequency range, and thus nineteen different five-wire codes are required for tuning (Table 4-1). The code is generated either externally (FREQUENCY MC switch S7 set at AUTOMATIC) by an encoder in the T-827/URT or internally by an encoder deck in switch S7 (FREQUENCY MC switch S7 set at one of the nineteen MC positions). In either case, a series of opens and grounds is

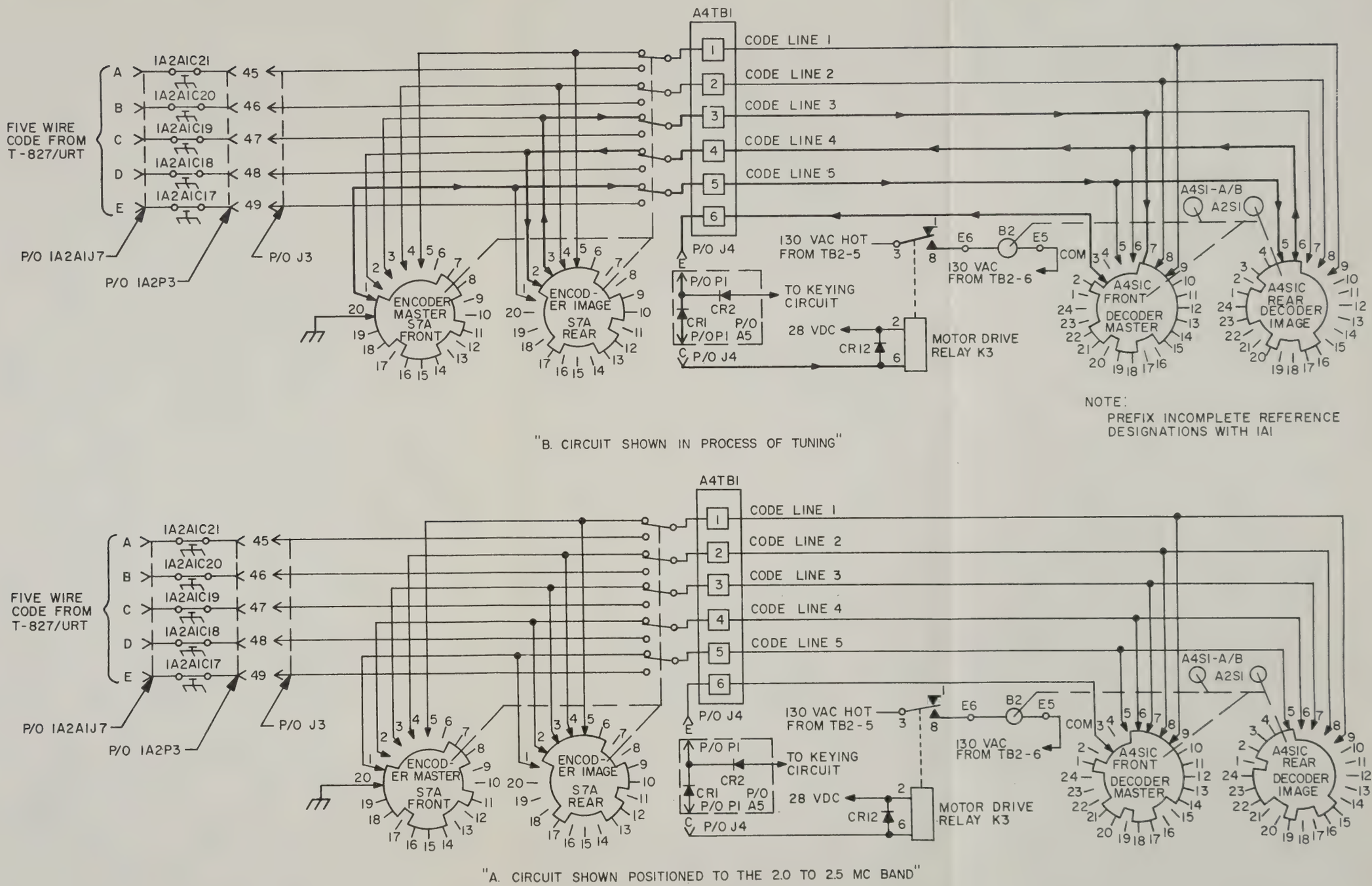


Figure 4-11. Tuning Circuit, Simplified Schematic Diagram

applied to the five code lines, through which the code is connected to decoder switch deck A4S1C. This established a ground path through contact 3 of A4S1C-front, terminal 6 of A4TB1, gate A5CR1, to pin 6 of motor drive relay K3. Since pin 2 of relay K3 is at 28 VDC, relay K3 energizes, connecting 130 VAC to motor B2. The motor rotates the decoder switch and the two bandswitches until the decoder code is the complement of the code generated by the encoder. At this time, the ground path to relay K3 is broken, de-energizing motor B2.

TABLE 4-1. TUNING CODE CHART

BAND	CODE LINES 1	2	3	4	5	BAND	CODE LINES 1	2	3	4	5
2.0 to 2.5	0	0	0	0	1	10.0 to 12.0	1	1	1	0	0
2.5 to 3.0	0	0	0	1	1	12.0 to 14.0	1	1	0	0	1
3.0 to 3.5	0	0	1	1	1	14.0 to 16.0	1	0	0	1	0
3.5 to 4.0	0	1	1	1	1	16.0 to 18.0	0	0	1	0	0
4.0 to 5.0	1	1	1	1	0	18.0 to 20.0	0	1	0	0	1
5.0 to 6.0	1	1	1	0	1	20.0 to 22.0	1	0	0	1	1
6.0 to 7.0	1	1	0	1	1	22.0 to 24.0	0	0	1	1	0
7.0 to 8.0	1	0	1	1	1	24.0 to 26.0	0	1	1	0	0
8.0 to 10.0	0	1	1	1	0	26.0 to 28.0	1	1	0	0	0
						28.0 to 30.0	1	0	0	0	0

4-86. Both the encoder and the decoder consist of a "master" section and an "image" section which is the mirror image of the master. The image sections are required to complete the ground path in certain combinations of encoder-decoder position (paragraph 4-87).

4-87. Figure 4-11A shows the circuit tuned for an operating frequency in the 2.0 to 2.5 MC band. This can be seen by noting that decoder master A4S1C pattern (1, 1, 1, 1, 0) is the complement of encoder master S7A pattern (0, 0, 0, 0, 1). Suppose, however, that the AM-3924(P)/URT had previously been tuned to the 2.5 to 3.0 MC band (one position clockwise), and that FREQUENCY MC switch S7 has just been set at the 2.0 to 2.5 MC band (figure 4-11B). In this situation contacts 3 and 7-8-9 of the decoder master are connected, but this does not complete the ground path to relay K3 since code lines 1 through 3 are not grounded by encoder S7 master. Instead, the ground path is provided through the image decks: from S7A-20front to S7A-1front to A4S1C-5 rear to A4S1C-6 rear to S7A-2 rear to S7A-3 rear to A4S1C-7 front to A4S1C-3 front to terminal 6 of the relay. Thus the relay energizes and motor B2 turns the decoder and bandswitches. The masters and images ensure that there will always be a ground path for any combination of encoder and decoder positions until the decoder reaches the unique position corresponding to that of the encoder.

4-88. TEST DATA. Pertinent references and applicable data for the tuning circuit are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram, Figure 5-26.

c. Driver Transformer Assembly 1A1A4, Schematic Diagram, Figure 5-25.

d. Driver Transformer Assembly 1A1A4, Component and Test Point Locations, Figure 5-13.

e. Radio Frequency Amplifier AM-3924(P)/URT, Bottom View, Component Locations, Figure 5-8.

f. Radio Fequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram, Figure 4-22.

g. Required Test Equipment:

(1) Multimeter AN/PSM-4

4-89. MULTIPURPOSE METER CIRCUIT.

4-90. GENERAL. The multipurpose meter circuit (figure 4-12) consists of a meter, switch, detector circuit, and various voltage dividers. The function of this circuit is to allow the important parameters of the amplifier to be monitored.

4-91. CIRCUIT DESCRIPTION. Eight parameters are monitored as follows:

a. When the Multipurpose meter switch is set at DRIVER 2 AMPERES, the voltage developed across resistor A1R1 by the cathode current of electron tube A1V2 is applied through calibrating resistor A1R3 and contacts 1 and 9 of switch S5 to meter M1. Therefore, the cathode current of electron tube A1V2 can be measured or monitored. Capacitor A1C13 is an RF bypass.

b. When the Multipurpose meter switch is set at DRIVER 1 AMPERES, the voltage developed across resistor A1R2 by the cathode current of electron tube A1V1 is applied through calibrating resistor A1R4 and contacts 2 and 9 of switch S5 to meter M1. Therefore, the cathode current of electron tube A1V1 can be measured or monitored. Capacitor A1C14 is an RF bypass.

c. When the Multipurpose meter switch is set at PA PLATE 2 AMPERES, the voltage developed across resistor R27-R28 by the cathode current of electron tube V2 is applied through calibrating resistor R4 and contacts 3 and 9 of switch S5 to meter M1. Therefore, the cathode current of electron tube V2 can be monitored or measured. Capacitor C19 is an RF bypass.

d. When the Multipurpose meter switch is set at PA PLATE 1 AMPERES, the voltage developed across resistor R25-R26 by the cathode current of electron tube V1 is applied through calibrating resistor R3 and contacts 4 and 9 of switch S5 to meter M1. Therefore, the cathode current of electron tube V1 can be monitored or measured. Capacitor C7 is an RF bypass.

e. The RF input to the AM-3924(P)/URT is coupled by capacitor A1C18 to voltage doubler-detector circuit A1CR1-CR2. The negative peaks of the RF input signal are clamped to ground by diode A1CR2. The positive peaks of the RF input signal are then detected by diode A1CR1, filtered by capacitor A1C17, and developed across base resistor A6R4, resulting in a DC signal equal to the peak-to-peak input voltage. Emitter follower A6Q1 provides the current gain required to operate the meter. Its output is applied through dropping resistor A6R3 and contacts 5 and 9 of switch S5 to meter M1. When Multipurpose meter

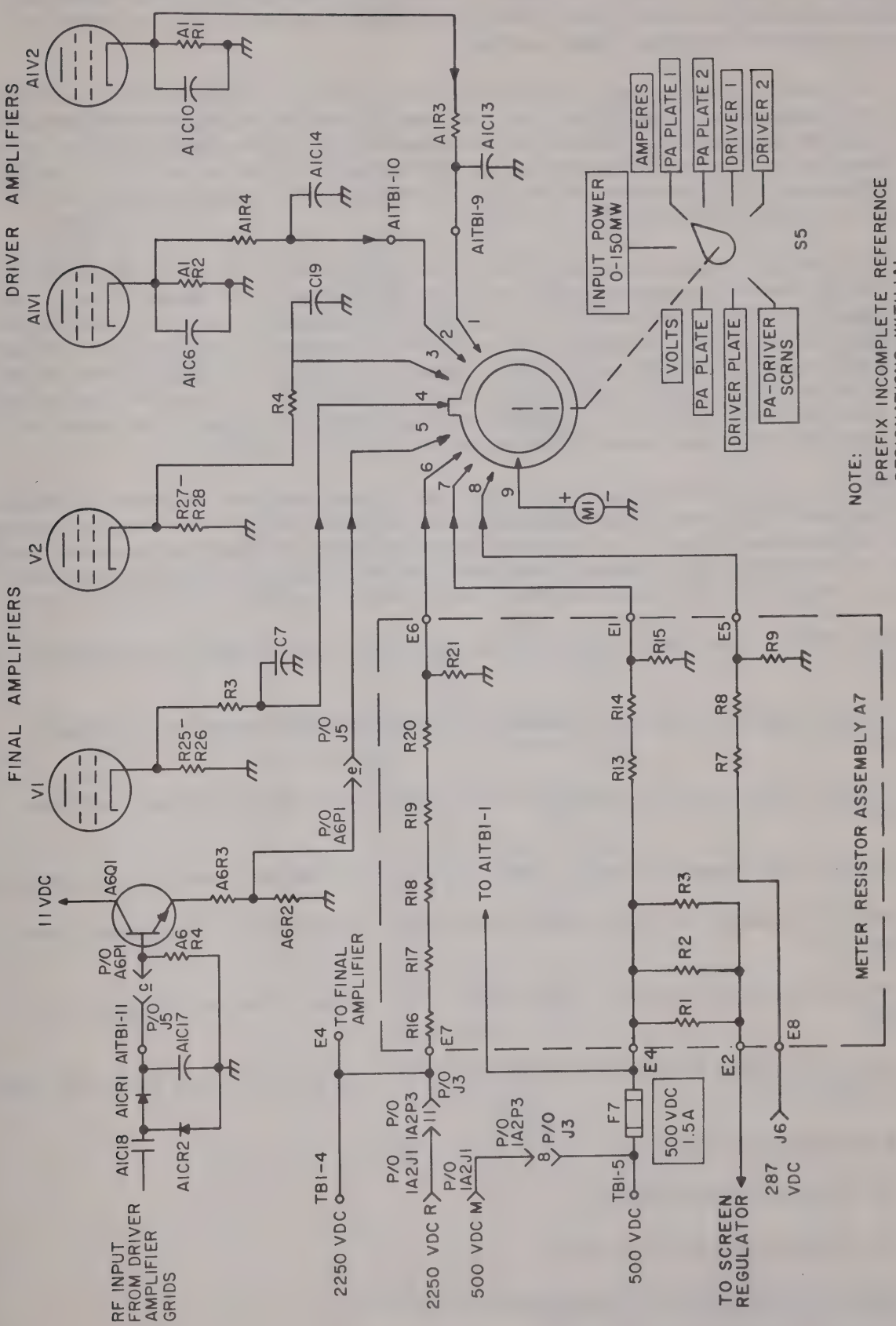


Figure 4-12. Metering Circuit, Simplified Schematic Diagram

switch S5 is set at INPUT POWER 0-150 MW, meter M1 indicates RF input voltage on a scale calibrated in terms of RF power. Resistor A6R2 serves as a load for transistor A6Q1 when switch S5 is in some other position.

f. The 2250 VDC output from the PP-3916/UR (1A2J1-R) or PP-3917/UR (TB1-4) is applied to the plates of final amplifier electron tubes V1 and V2 and to meter dropping resistors A7R16 through A7R20. Therefore, the plate voltage for the final amplifier tubes can be measured or monitored when the Multipurpose meter switch is set at PA PLATE VOLTS. Resistor A7R21 prevents the voltage at terminal A7E6 from rising to 2250 VDC when switch S5 is not set at PA PLATE VOLTS.

g. The 500 VDC output from the PP-3916/UR (1A2J1-M) or PP-3917/UR (TB1-5) is applied through fuse F7 to terminal 1 of A1TB1 for application to the plates of the driver amplifier electron tubes. The 500 VDC is also applied through the parallel connected current limiting resistors A7R1 through A7R3 to the screen regulator (paragraph 4-108) and to meter dropping resistors A7R13 and A7R14. Therefore, the plate voltage for the driver amplifier electron tubes can be measured or monitored when the Multipurpose meter switch is set at DRIVER PLATE VOLTS. Resistor A7R15 prevents the voltage at terminal A7E1 from rising to 500 VDC when switch S5 is not set at DRIVER PLATE VOLTS.

h. The 287 VDC at the J6 output of the screen voltage regulator is applied to meter dropping resistors A7R7 and A7R8. Therefore, the screen voltage to the final and driver amplifier electron tubes can be measured or monitored when the Multipurpose meter switch is set at PA-DRIVER SCRNS VOLTS. Resistor A7R9 prevents the voltages at terminal A7E5 from rising to 287 VDC when switch S5 is not set at PA-DRIVER SCRNS VOLTS.

4-92. TEST DATA. Pertinent references and applicable data for the metering circuit are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Printed Circuit Board Assembly 1A1A7, Component and Test Point Locations, Figure 5-16.

c. Driver Tube Assembly 1A1A1, Component and Test Point Locations, Figure 5-10.

d. Radio Frequency Amplifier AM-3924(P)/URT, Bottom View, Component Locations, Figure 5-8.

e. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram, Figure 5-26.

f. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram, Figure 4-22.

g. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) Signal Generator SG-582/U

h. Transistor DC Voltage Measurements, Table 5-5.

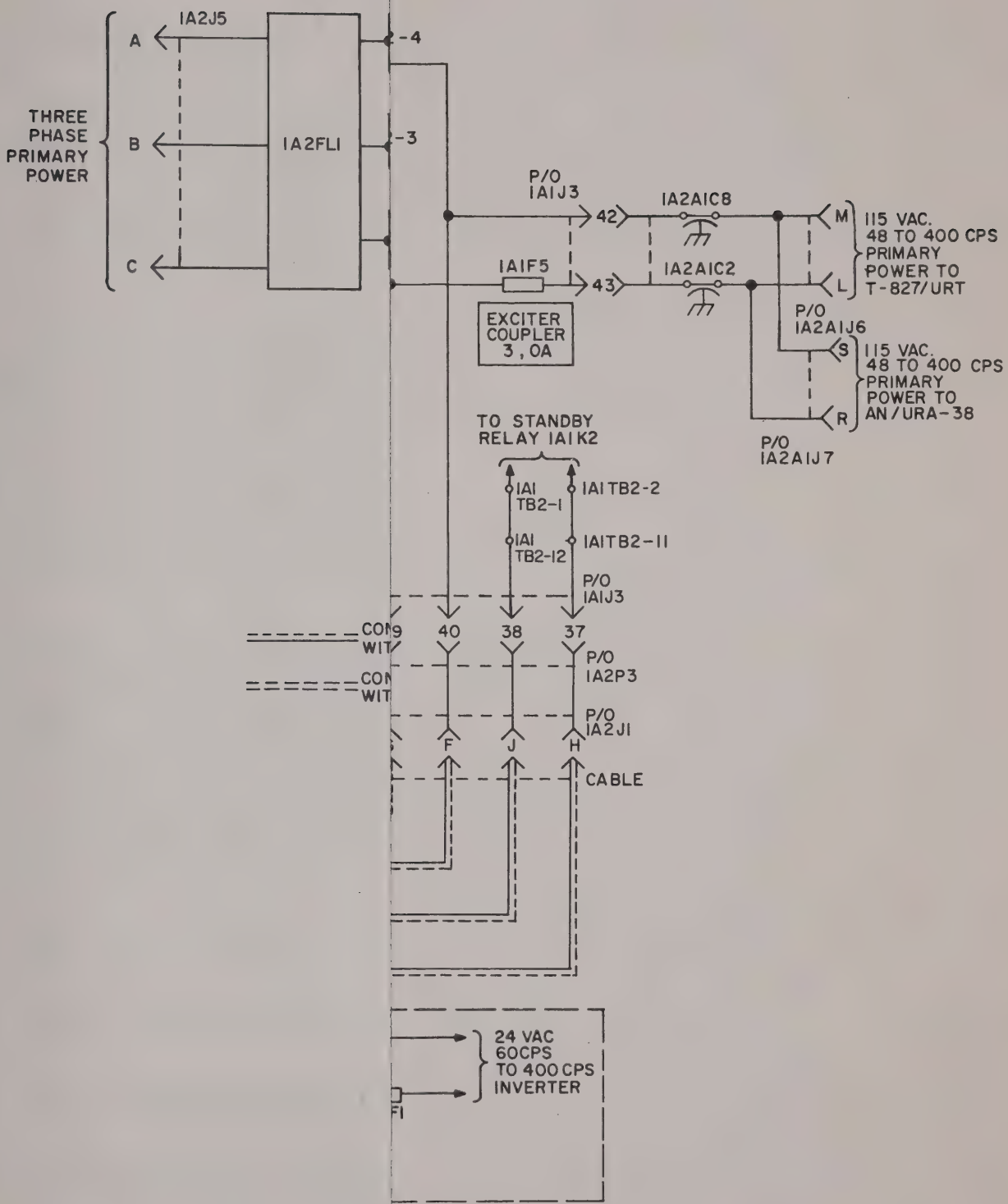


Figure 4-13. Initial Turn-On Circuit, Simplified Schematic Diagram

switch S5 is set at INPUT POWER 0-150 MW, meter M1 indicates RF input voltage on a scale calibrated in terms of RF power. Resistor A6R2 serves as a load for transistor A6Q1 when switch S5 is in some other position.

f. The 2250 VDC output from the PP-3916/UR (1A2J1-R) or PP-3917/UR (TB1-4) is applied to the plates of final amplifier electron tubes V1 and V2 and to meter dropping resistors A7R16 through A7R20. Therefore, the plate voltage for the final amplifier tubes can be measured or monitored when the Multipurpose meter switch is set at PA PLATE VOLTS. Resistor A7R21 prevents the voltage at terminal A7E6 from rising to 2250 VDC when switch S5 is not set at PA PLATE VOLTS.

g. The 500 VDC output from the PP-3916/UR (1A2J1-M) or PP-3917/UR (TB1-5) is applied through fuse F7 to terminal 1 of A1TB1 for application to the plates of the driver amplifier electron tubes. The 500 VDC is also applied through the parallel connected current limiting resistors A7R1 through A7R3 to the screen regulator (paragraph 4-108) and to meter dropping resistors A7R13 and A7R14. Therefore, the plate voltage for the driver amplifier electron tubes can be measured or monitored when the Multipurpose meter switch is set at DRIVER PLATE VOLTS. Resistor A7R15 prevents the voltage at terminal A7E1 from rising to 500 VDC when switch S5 is not set at DRIVER PLATE VOLTS.

h. The 287 VDC at the J6 output of the screen voltage regulator is applied to meter dropping resistors A7R7 and A7R8. Therefore, the screen voltage to the final and driver amplifier electron tubes can be measured or monitored when the Multipurpose meter switch is set at PA-DRIVER SCRNS VOLTS. Resistor A7R9 prevents the voltages at terminal A7E5 from rising to 287 VDC when switch S5 is not set at PA-DRIVER SCRNS VOLTS.

4-92. TEST DATA. Pertinent references and applicable data for the metering circuit are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Printed Circuit Board Assembly 1A1A7, Component and Test Point Locations, Figure 5-16.

c. Driver Tube Assembly 1A1A1, Component and Test Point Locations, Figure 5-10.

d. Radio Frequency Amplifier AM-3924(P)/URT, Bottom View, Component Locations, Figure 5-8.

e. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram, Figure 5-26.

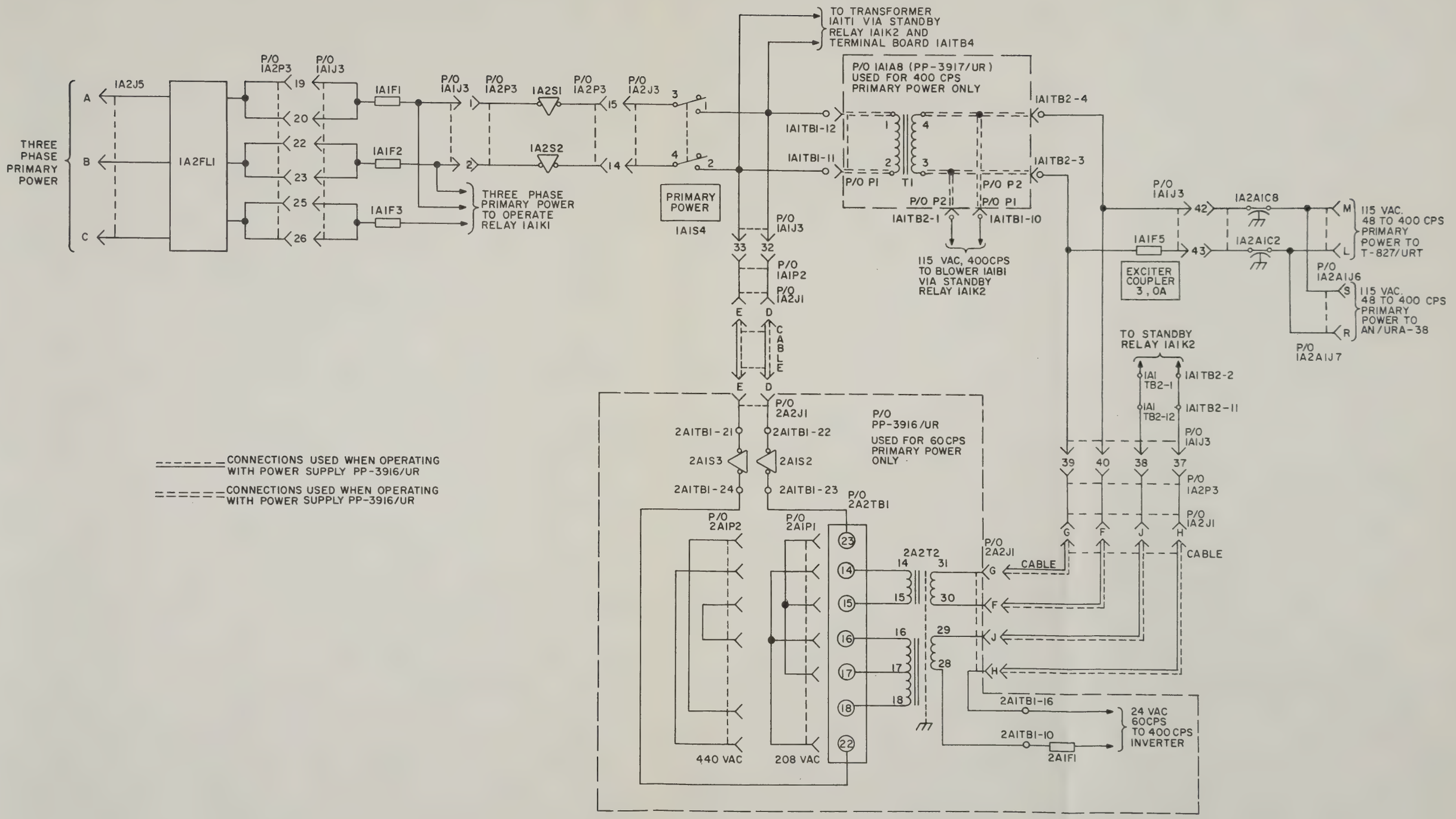
f. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram, Figure 4-22.

g. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) Signal Generator SG-582/U

h. Transistor DC Voltage Measurements, Table 5-5.



CONNECTIONS USED WHEN OPERATING WITH POWER SUPPLY PP-3916/UR

CONNECTIONS USED WHEN OPERATING WITH POWER SUPPLY PP-3916/UR

Figure 4-13. Initial Turn-On Circuit, Simplified Schematic Diagram

4-93. INITIAL TURN-ON CIRCUIT.

4-94. GENERAL. The initial turn-on circuit (figure 4-13) consists of various transformers, switches, fuses, and jumpering schemes. The primary function of this circuit is to direct phases A and B of the primary power to the power supply for conversion to 115 volt, single phase primary power for the T-827/URT and AN/URA-38. The actual means of developing this power depends on whether the PP-3916/UR or PP-3917/UR is used with the system, i.e. whether the primary power is 60 or 400 CPS.

4-95. CIRCUIT DESCRIPTION. When PRIMARY POWER switch 1A1S4 is set at ON, phases A and B of the primary power are applied to terminals 11 and 12 of terminal board 1A1TB1. These two phases are interlocked to prevent operation when the chassis is extended from the case. From terminal board 1A1TB1, phases A and B are applied (phase A through standby relay 1A1K2) to terminal board 1A1TB4 for connection to the internal power supply when the system is placed in standby (paragraph 4-99). Also, from terminal board 1A1TB2, phases A and B of the primary power are applied either to the PP-3916/UR or PP-3917/UR.

4-96. When the PP-3916/UR is used, phases A and B of the primary power are applied to terminals 23 and 24 of the PP-3916/UR terminal board 2A1TB1. Both phases A and B are interlocked to prevent operation when the hinged front panel is opened. From terminal board 2A1TB1, phases A and B are applied through one of two jumpering schemes to the primary of transformer 2A2T2. The jumpering scheme used depends on whether the primary line-to-line voltage is 440 or 208. Transformer 2A1T2 has two 60 CPS outputs; 115 volts and 24 volts. The 115 volt output from winding 31-30 is applied through the interconnecting cabling to the AM-3924(P)/URT, from which it is supplied as primary power through connector 1A2A1J6 to the T-827/URT and through connector 1A2A1J7 to the AN/URA-38. The 24 volt output from transformer 2A1T2 is applied to the PP-3916/UR 400 CPS inverter, one side first being switched by standby relay 1A1K2 (paragraph 4-99).

4-97. When the PP-3917/UR is used, phases A and B of the primary power are jumpered through fanning strip 1A1A8P1 to the primary of transformer 1A1A8T1. The 115 VAC, 400 CPS single phase output from transformer 1A1A8T1 is applied through fanning strip 1A1A8P2 to terminals 3 and 4 of the AM-3924(P)/URT terminal board 1A1TB2 and terminals 1 and 10 of terminal boards 1A1TB2 and 1A1TB1, respectively. From terminals 3 and 4 of terminal board 1A1TB2, the 115 volts is applied as primary power to the T-827/URT and AN/URA-38 through connectors 1A2A1J6 and 1A2A1J7, respectively. From terminal 10 of terminal board 1A1TB1 and terminal 1 of terminal board 1A1TB2, the 115 volt output is applied to the blower and indicator lights (paragraph 4-99), one side first being switched by standby relay 1A1K2.

4-98. TEST DATA. Pertinent references and applicable data for the initial turn-on circuit are as follows:

a. Radio Frequency Amplifier, AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier, AM-3924(P)/URT, Case, Schematic Diagram, Figure 5-26.

c. Power Supply PP-3916/UR, Schematic Diagram, Figure 5-28.

d. Power Supply PP-3917/UR, Schematic Diagram, Figure 5-27.

e. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

f. Radio Frequency Amplifier AM-3924(P)/URT, Case, Component Locations, Figure 5-17.

g. Power Supply PP-3916/UR, Component Locations, Figure 5-20.

h. Power Supply PP-3917/UR, Component Locations, Figure 5-18.

i. Radio Frequency Amplifier, AM-3924(P)/URT, DC Power Control, Servicing Block Diagram, Figure 4-24.

j. 60 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-25.

k. 400 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-26.

l. Required Test Equipment:

(1) Multimeter AN/PSM-4

4-99. STANDBY POWER DISTRIBUTION CIRCUIT.

4-100. GENERAL. The standby power distribution circuit (figure 4-14) consists of a relay, and various power supply and switching circuits. The function of this circuit is to produce all voltages required to operate the AM-3924(P)/URT, except the high voltages required by the electron tubes in the final and driver amplifiers.

4-101. CIRCUIT DESCRIPTION. After intial turn-on has been accomplished at the AM-3924(P)/URT (paragraph 4-93) further control of the system is accomplished from the T-827 URT. When the T-827/URT Mode Selector switch is set at STD BY, the 28 VDC standby-operate output from the T-827/URT is applied to pin 2 of standby relay 1A1K2. Since the other side of standby relay 1A1K2 is at ground, relay 1A1K2 energizes. This connects phase A of the primary power through contacts 7 and 4 to terminal 1 of terminal board 1A1TB4. (Phase B of the primary power was directly applied to terminal 13 of terminal board 1A1TB4 at the time that the PRIMARY POWER switch was set at ON (paragraph 4-93).) This line-to-line voltage is applied through one of three jumpering schemes to the primary windings of transformer 1A1T1. The exact jumpering scheme used depends on the line-to-line voltage of the primary power: 440, 208, or 115. Transformer 1A1T1 has six secondary windings: windings 24-25 and 22-23 provide the 6.0 VAC required by the filaments of the two electron tubes in the final amplifier. Winding 16-17 is used to produce the 13.5 VAC required by the filaments of the two electron tubes in the driver amplifier. Winding 18-19 produces the AC input voltage required by ±12 VDC remote power supply (paragraph 4-116). Winding 13-14-15 produces the AC input voltage required by the 11, 20, 28 VDC power supply (paragraph 4-110). Winding 20-21 produces the AC input voltage required by the bias power supply (paragraph 4-70). In addition, if the primary power is 60 CPS, the 115 VAC output from winding 20-21 is applied through fanning strip 1A1P5 and terminal board 1A1TB2 to time elapsed meter 1A1B3. If the primary power is 400 CPS, the 28 VDC output from the 11, 20, 28 VDC power supply is applied through fanning strip 1A1A8P1 to the PP-3917/UR 60 CPS inverter, which converts the 28 VDC to 120 and 130 VAC 60 CPS power. The 120 VAC is applied through fanning strip 1A1A8P1 and terminal board 1A1TB2 to time elapsed meter 1A1B3, and the 130 VAC output from the 60 CPS inverter is applied through fanning strip 1A1A8P1 and terminal board 1A1TB2 to the tuning circuit. (When the primary power source is 60 CPS, 115 VAC is applied to the tuning circuit at the time of initial turn-on through

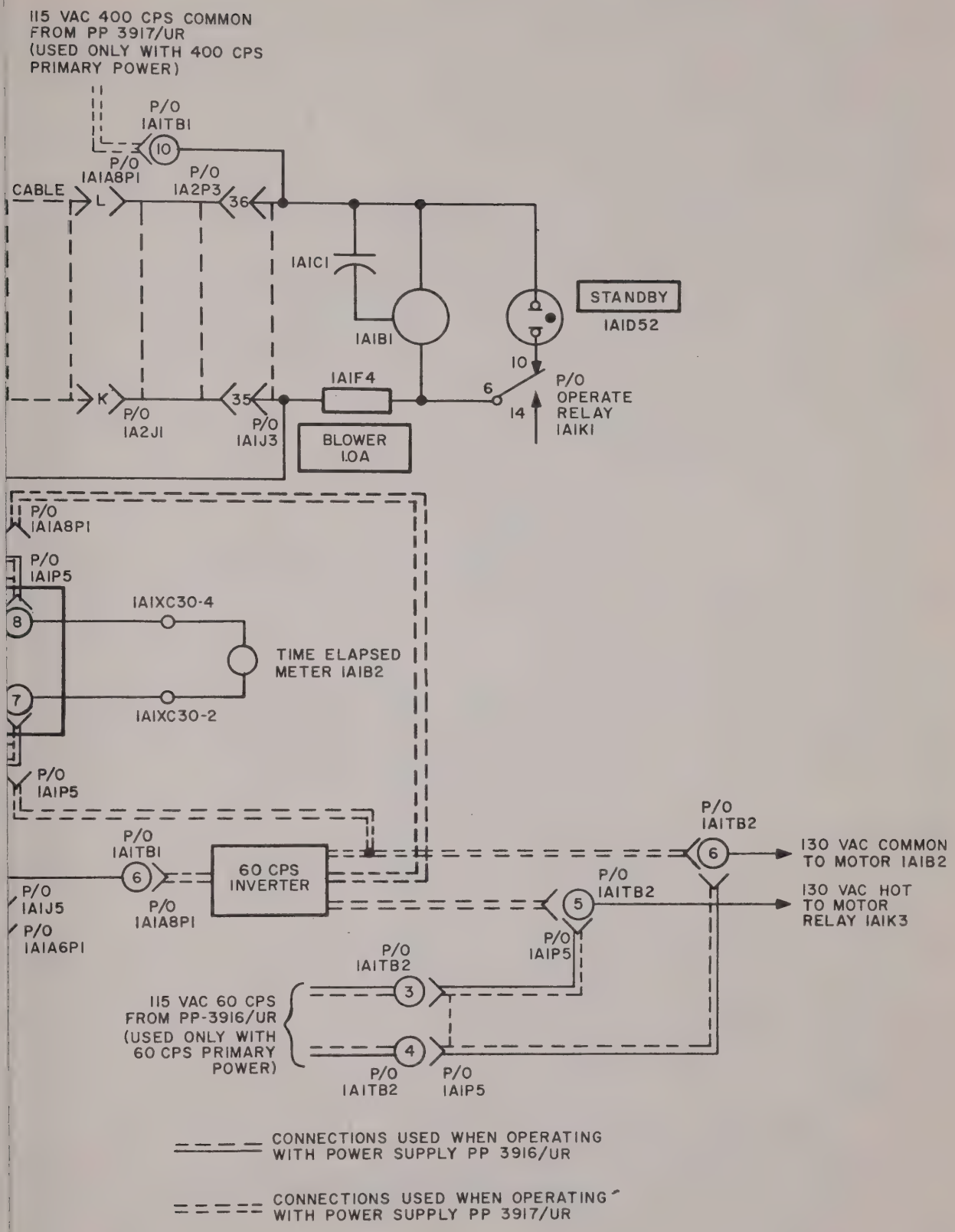


Figure 4-14. Standby Power Distribution Diagram

e. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

f. Radio Frequency Amplifier AM-3924(P)/URT, Case, Component Locations, Figure 5-17.

g. Power Supply PP-3916/UR, Component Locations, Figure 5-20.

h. Power Supply PP-3917/UR, Component Locations, Figure 5-18.

i. Radio Frequency Amplifier, AM-3924(P)/URT, DC Power Control, Servicing Block Diagram, Figure 4-24.

j. 60 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-25.

k. 400 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-26.

l. Required Test Equipment:

(1) Multimeter AN/PSM-4

4-99. STANDBY POWER DISTRIBUTION CIRCUIT.

4-100. GENERAL. The standby power distribution circuit (figure 4-14) consists of a relay, and various power supply and switching circuits. The function of this circuit is to produce all voltages required to operate the AM-3924(P)/URT, except the high voltages required by the electron tubes in the final and driver amplifiers.

4-101. CIRCUIT DESCRIPTION. After intial turn-on has been accomplished at the AM-3924(P)/URT (paragraph 4-93) further control of the system is accomplished from the T-827/URT. When the T-827/URT Mode Selector switch is set at STD BY, the 28 VDC standby-operate output from the T-827/URT is applied to pin 2 of standby relay 1A1K2. Since the other side of standby relay 1A1K2 is at ground, relay 1A1K2 energizes. This connects phase A of the primary power through contacts 7 and 4 to terminal 1 of terminal board 1A1TB4. (Phase B of the primary power was directly applied to terminal 13 of terminal board 1A1TB4 at the time that the PRIMARY POWER switch was set at ON (paragraph 4-93).) This line-to-line voltage is applied through one of three jumpering schemes to the primary windings of transformer 1A1T1. The exact jumpering scheme used depends on the line-to-line voltage of the primary power: 440, 208, or 115. Transformer 1A1T1 has six secondary windings: windings 24-25 and 22-23 provide the 6.0 VAC required by the filaments of the two electron tubes in the final amplifier. Winding 16-17 is used to produce the 13.5 VAC required by the filaments of the two electron tubes in the driver amplifier. Winding 18-19 produces the AC input voltage required by ±12 VDC remote power supply (paragraph 4-116). Winding 13-14-15 produces the AC input voltage required by the 11, 20, 28 VDC power supply (paragraph 4-110). Winding 20-21 produces the AC input voltage required by the bias power supply (paragraph 4-70). In addition, if the primary power is 60 CPS, the 115 VAC output from winding 20-21 is applied through fanning strip 1A1P5 and terminal board 1A1TB2 to time elapsed meter 1A1B3. If the primary power is 400 CPS, the 28 VDC output from the 11, 20, 28 VDC power supply is applied through fanning strip 1A1A8P1 to the PP-3917/UR 60 CPS inverter, which converts the 28 VDC to 120 and 130 VAC 60 CPS power. The 120 VAC is applied through fanning strip 1A1A8P1 and terminal board 1A1TB2 to time elapsed meter 1A1B3, and the 130 VAC output from the 60 CPS inverter is applied through fanning strip 1A1A8P1 and terminal board 1A1TB2 to the tuning circuit. (When the primary power source is 60 CPS, 115 VAC is applied to the tuning circuit at the time of initial turn-on through

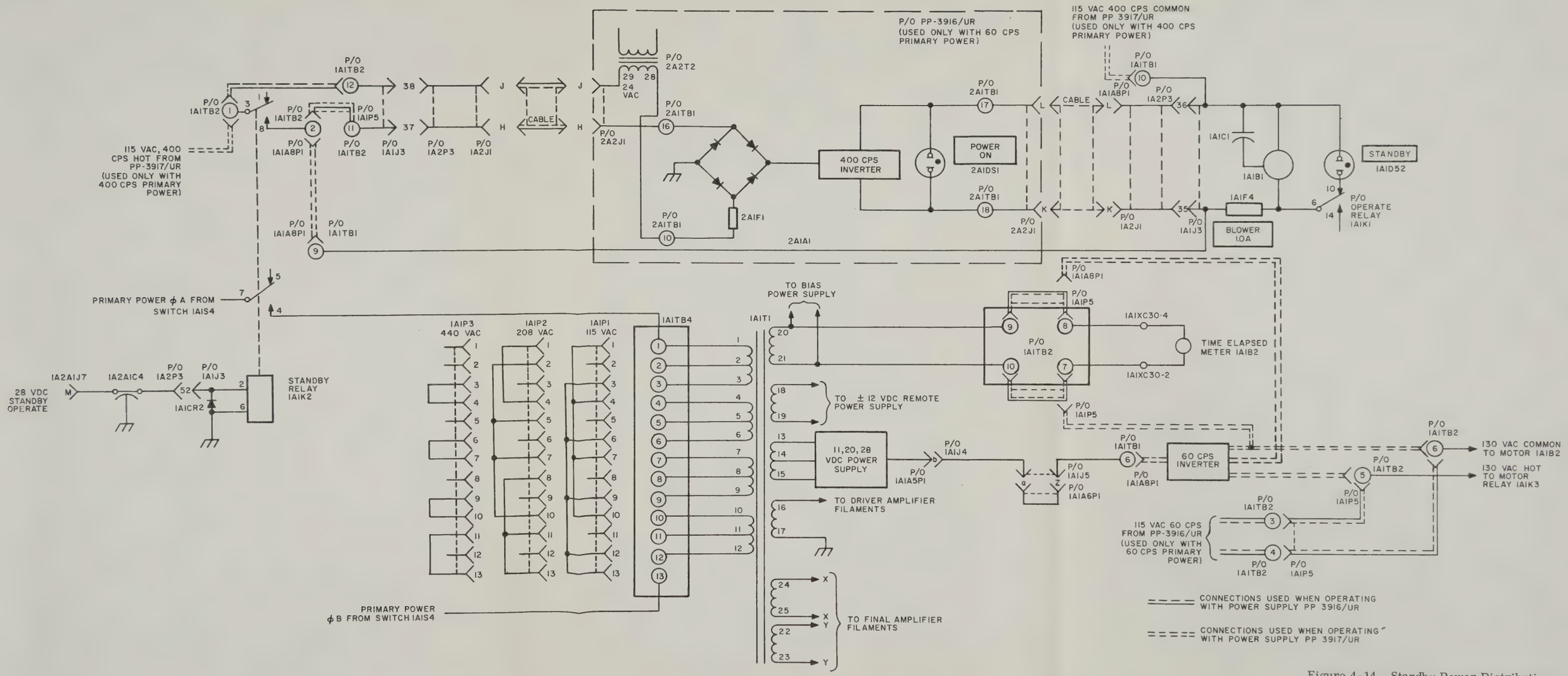


Figure 4-14. Standby Power Distribution Diagram

terminals 3 and 4 of terminal board 1A1TB2 from the PP-3916/UR.) Therefore, regardless of the frequency of the primary power, the time elapsed meter and the tuning motor have the required 60 CPS power applied for operation.

4-102. The AM-3924(P)/URT indicator lamps and blower required 115 VAC, 400 CPS single phase power for operation. This power is developed when tne system is placed in standby as follows. If the primary power source is 400 CPS, the 115 VAC, 400 CPS output from transformer 1A1A8T1 after initial turn on (paragraph 4-93) is applied through contacts 3 and 8 of standby relay 1A1K2, terminal board 1A1TB2, fanning strip 1A1A8P1, terminal board 1A1TB1, BLOWER 1.0 A fuse 1A1F4 to one side of the blower and through operate relay 1A1K1 contacts 6 and 10 to STANDBY indicator 1A1DS2. Since the common side of the 115 VAC output from the PP-3917/UR is applied directly through fanning strip 1A1A8P1 and terminal board 1A1TB1 at the time of initial turn-on, the blower and STANDBY indicator lamp 1A1DS2 both energize, indicating that the system is in a standby condition.

4-103. If the primary power source is 60 CPS, the PP-3916/UR is not used and fanning strip 1A1A8P1 is not connected. In this condition, the 24 VAC output from the PP-3916/UR is applied to the standby relay at the time of initial turn-on (paragraph 4-93), instead of the 115 VAC 400 CPS when the PP-3917/UR is used. This 24 VAC is applied through contacts 3 and 8 of standby relay 1A1K2, terminal board 1A1TB2, fanning strip 1A1P5, and the interconnecting cabling to the full wave rectifier bridge in the PP-3916/UR 400 CPS inverter. The 115 VAC, 400 CPS output produced by the inverter (paragraph 4-127) is applied to POWER ON indicator lamp 2A1DS1 and interconnecting cabling, to the AM-3924(P)/URT STANDBY indicator lamp and blower. Therefore, the indicator lamps and blowers have 115 VAC, 400 CPS power switched to them at the time the system is placed in standby, regardless of the frequency of the primary power.

4-104. Thus, when the system is placed in standby, all voltages required for operation of the tuning, protection, control, filament, blower, indicator lamps, and time elapsed meter circuits are available. The only voltages not yet available are the high voltages required for powering the plates and screens of the electron tubes of the final and driver amplifiers (paragraph 4-106).

4-105. TEST DATA. Pertinent references and applicable data for the standby power distribution circuit are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram, Figure 5-26.

c. Power Supply PP-3916/UR, Schematic Diagram, Figure 5-28.

d. Power Supply PP-3917/UR, Schematic Diagram, Figure 5-27.

e. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

f. Radio Frequency Amplifier AM-3924(P)/URT, Case, Component Locations, Figure 5-17.

g. Power Supply PP-3916/UR, Component Locations, Figure 5-20.

h. Power Supply PP-3917/UR, Component Locations, Figure 5-18.

i. Radio Frequency Amplifier AM-3924(P)/URT, DC Power Control Servicing Block Diagram, Figure 4-24.

j. 60 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-25.

k. 400 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-26.

4-106. OPERATE POWER DISTRIBUTION CIRCUIT.

4-107. GENERAL. The operate power distribution circuit (figure 4-15) consists of two relays, a relay driver transistor, a regulator circuit and one of two high voltage power supplies, depending on the frequency of the primary power. The function of this circuit is to produce the 2250 and 500 VDC voltages required by the plate and screen circuits of the final and driver amplifiers.

4-108. CIRCUIT DESCRIPTION. When the T-827/URT Mode Selector switch is set at any of its operate positions, the 20 VDC operate output from the T-827/URT is applied to the contacts of time delay relay 1A1K4. Three minutes after application of heater power, (when the system is placed in standby, paragraph 4-99) time delay relay 1A1K4 energizes, allowing the 20 VDC to reach voltage divider 1A1A5R19-20. The time delay is provided to allow the cathodes of the electron tubes to reach operating temperature (prior to application of plate and screen voltages). Since the emitter of relay driver 1A1A5Q7 is at ground through the power supply interlock line (paragraph 4-77), the voltage applied to divider 1A1A5R19-20 turns relay driver 1A1A5Q7 on into saturation, effectively grounding terminal 2 of relay 1A1K1. This energizes operate relay 1A1K1. Therefore, three phase primary power is applied to terminals 1, 2, and 3 of terminal board 1A1TB1, from which it is applied to either the 60 CPS or 400 CPS high voltage power supply, depending on the frequency of the primary power. In either case, the high voltage power supply converts the three phase primary power to 2250 VDC and 500 VDC. These DC voltages are applied to the plate circuits of the electron tubes in the final and driver amplifiers, respectively. The 500 VDC is regulated to provide screen voltages in 6.2 volt steps between 287 and 318 VDC for both the final and driver amplifiers. Energizing operate relay 1A1K1 also extinguishes the STANDBY indicator lamp and in its place energizes the OPERATE indicator lamp.

4-109. TEST DATA. Pertinent references and applicable data for the operate power distribution circuit are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram, Figure 5-26.

c. Power Supply PP-3916/UR, Schematic Diagram, Figure 5-28.

d. Power Supply PP-3917/UR, Schematic Diagram, Figure 5-27.

e. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

f. Printed Circuit Board 1A1A5, Component and Test Point Locations, Figure 5-14.

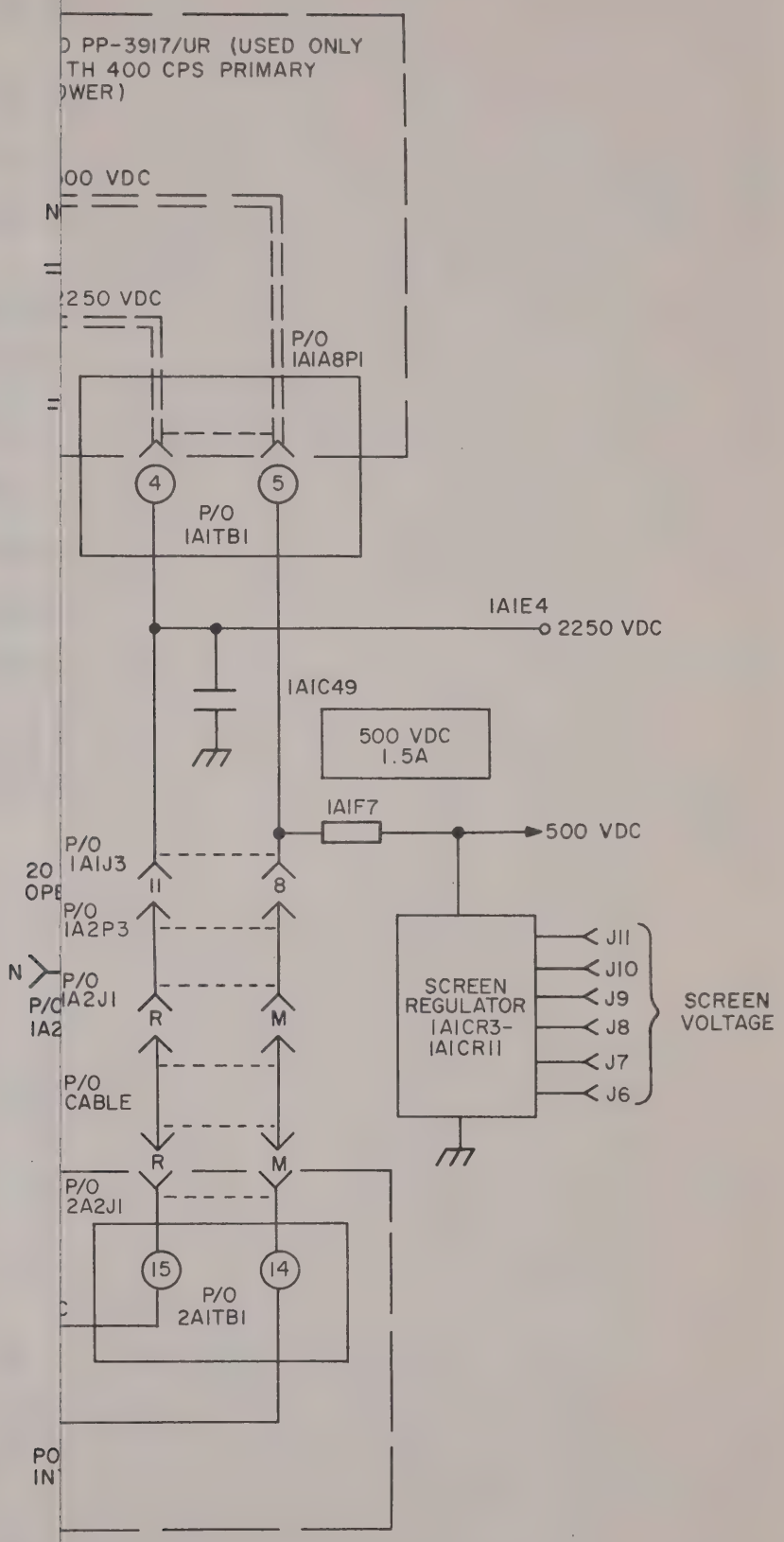


Figure 4-15. Operate Power Distribution Diagram

h. Power Supply PP-3917/UR, Component Locations, Figure 5-18.

i. Radio Frequency Amplifier AM-3924(P)/URT, DC Power Control Servicing Block Diagram, Figure 4-24.

j. 60 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-25.

k. 400 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-26.

4-106. OPERATE POWER DISTRIBUTION CIRCUIT.

4-107. GENERAL. The operate power distribution circuit (figure 4-15) consists of two relays, a relay driver transistor, a regulator circuit and one of two high voltage power supplies, depending on the frequency of the primary power. The function of this circuit is to produce the 2250 and 500 VDC voltages required by the plate and screen circuits of the final and driver amplifiers.

4-108. CIRCUIT DESCRIPTION. When the T-827/URT Mode Selector switch is set at any of its operate positions, the 20 VDC operate output from the T-827/URT is applied to the contacts of time delay relay 1A1K4. Three minutes after application of heater power, (when the system is placed in standby, paragraph 4-99) time delay relay 1A1K4 energizes, allowing the 20 VDC to reach voltage divider 1A1A5R19-20. The time delay is provided to allow the cathodes of the electron tubes to reach operating temperature (prior to application of plate and screen voltages). Since the emitter of relay driver 1A1A5Q7 is at ground through the power supply interlock line (paragraph 4-77), the voltage applied to divider 1A1A5R19-20 turns relay driver 1A1A5Q7 on into saturation, effectively grounding terminal 2 of relay 1A1K1. This energizes operate relay 1A1K1. Therefore, three phase primary power is applied to terminals 1, 2, and 3 of terminal board 1A1TB1, from which it is applied to either the 60 CPS or 400 CPS high voltage power supply, depending on the frequency of the primary power. In either case, the high voltage power supply converts the three phase primary power to 2250 VDC and 500 VDC. These DC voltages are applied to the plate circuits of the electron tubes in the final and driver amplifiers, respectively. The 500 VDC is regulated to provide screen voltages in 6.2 volt steps between 287 and 318 VDC for both the final and driver amplifiers. Energizing operate relay 1A1K1 also extinguishes the STANDBY indicator lamp and in its place energizes the OPERATE indicator lamp.

4-109. TEST DATA. Pertinent references and applicable data for the operate power distribution circuit are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram, Figure 5-26.

c. Power Supply PP-3916/UR, Schematic Diagram, Figure 5-28.

d. Power Supply PP-3917/UR, Schematic Diagram, Figure 5-27.

e. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations, Figure 5-7.

f. Printed Circuit Board 1A1A5, Component and Test Point Locations, Figure 5-14.

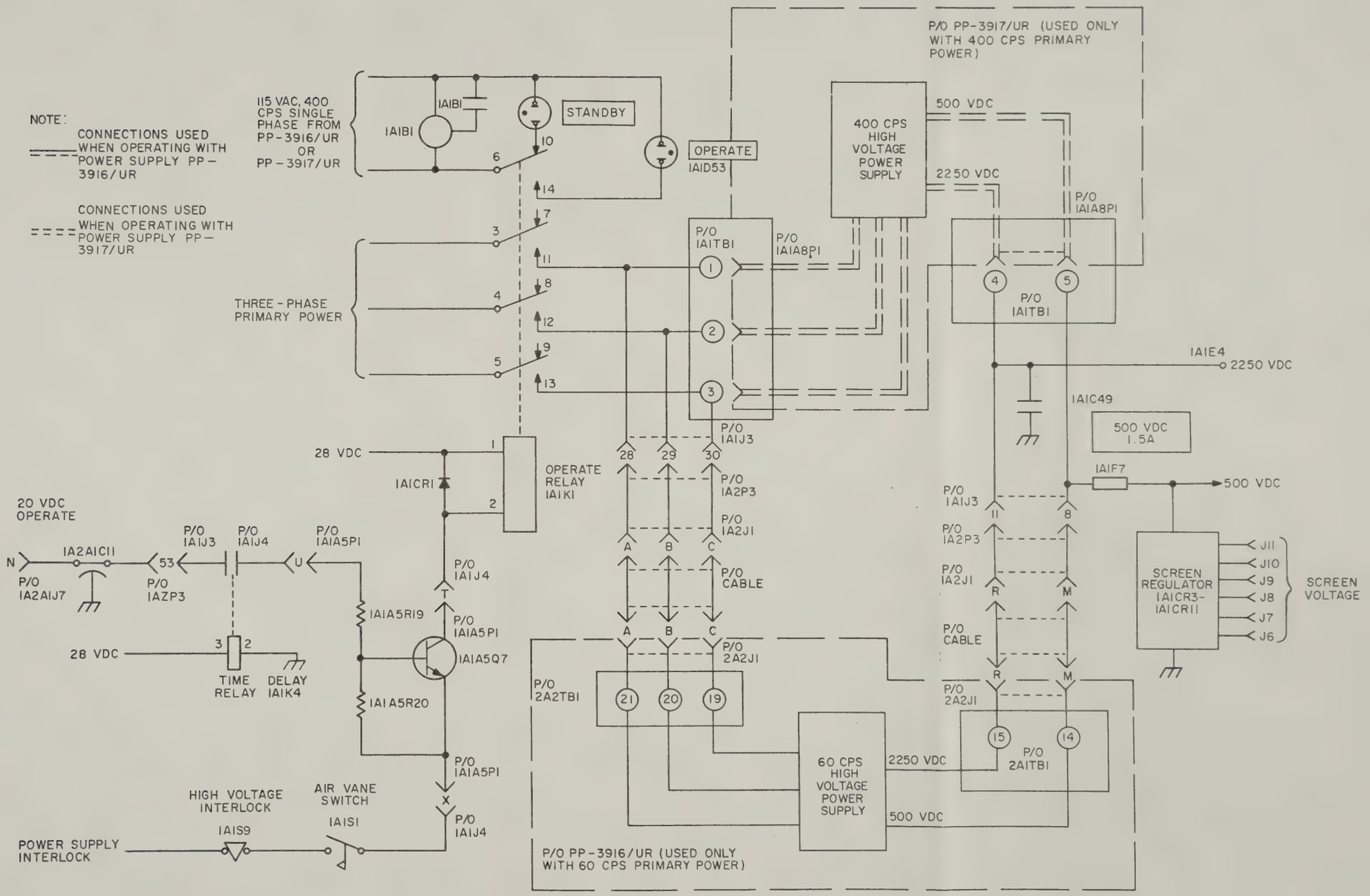


Figure 4-15. Operate Power Distribution Diagram

g. Radio Frequency Amplifier, AM-3924(P)/URT, Case, Component Locations, Figure 5-17.

h. Power Supply PP-3916/UR, Component Locations, Figure 5-20.

i. Power Supply PP-3917/UR, Component Locations, Figure 5-18.

j. Radio Frequency Amplifier AM-3924(P)/URT, DC Power Control, Servicing Block Diagram, Figure 4-24.

k. 60 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-25.

l. 400 CPS High Voltage Distribution Servicing Block Diagram, Figure 4-26.

m. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) PC Board Extender (paragraph 5-44).

n. Transistor DC Voltage Measurements, Table 5-5.

4-110. 11, 20, AND 28 VDC POWER SUPPLY.

4-111. GENERAL. The 11, 20, and 28 VDC power supply (figure 4-16) consists of two full wave rectifiers, a regulator, and a filter. The function of these circuits is to produce all the low DC voltages required for operation of the AM-3924(P)/URT control circuits.

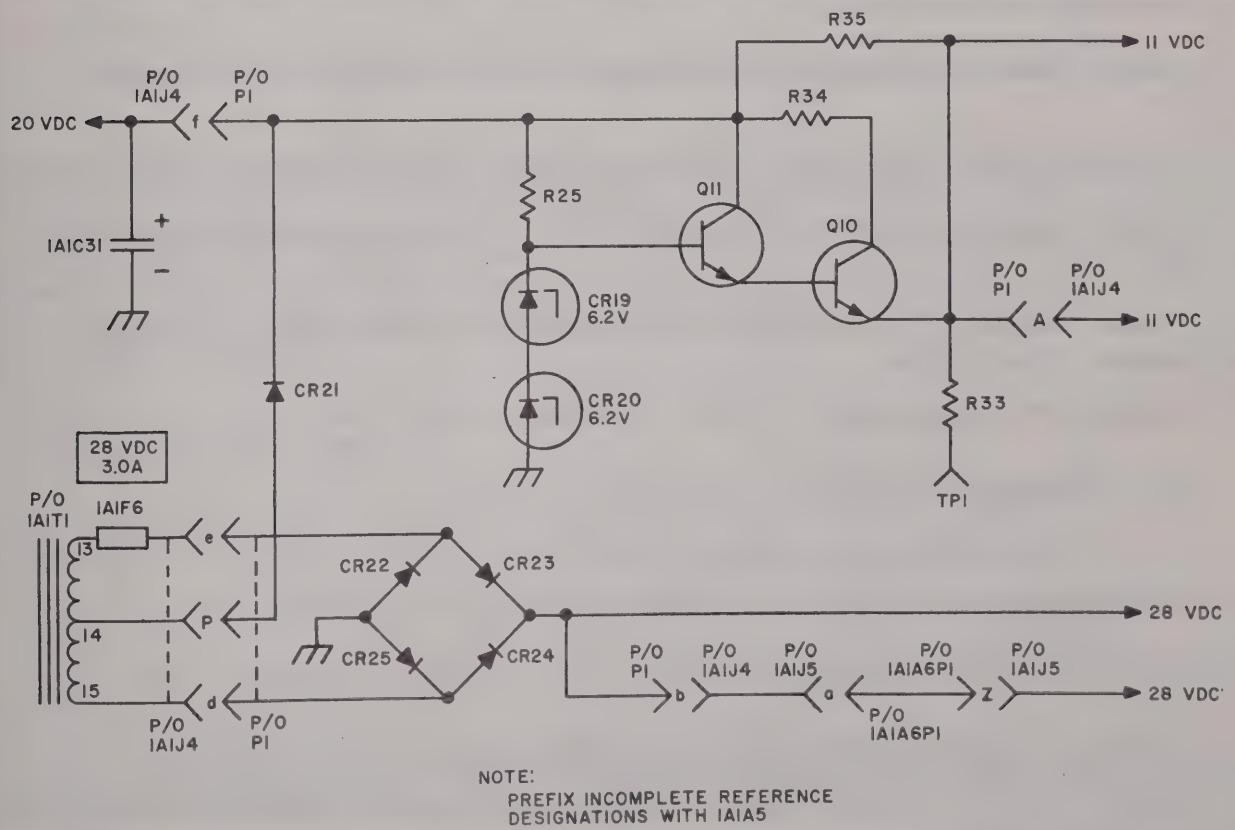


Figure 4-16. 11, 20, and 28 VDC Power Supply, Simplified Schematic Diagram

4-112. CIRCUIT DESCRIPTION. The output from winding 13-15 of transformer 1A1T1 is full-wave rectified by diodes CR22 through CR25, producing an unfiltered VDC output whose average value is 28V. This voltage is used to energize the AM-3924(P)/URT relays and is applied through the 28 VDC switch circuit (paragraph 4-64) to energize the T-827/URT T/R relays. The 28 VDC connection to the relays is interlocked through pin b of connector P1 and 1A1J4 and pins a and z of connectors 1A1J5 and 1A1A6P1. This interlock is provided so that the system can not be energized if either printed circuit board is removed from the equipment, therefore preventing operation in the absence of the control circuits.

4-113. Since a bridge rectifier such as CR22 through CR25 always grounds whichever side of the transformer is instantaneously the negative side, the other side of the transformer (the side not grounded at any instant) must always be positive with respect to ground. Since terminal 14 of transformer 1A1T1 is the center-tap of a transformer which feeds a bridge rectifier, it follows that it also must always be positive with respect to ground, but with a voltage equal to one-half that of the full winding. Therefore, the voltage at terminal 14 is a full-wave rectified signal that is one-half of the full (28 VDC) output. Diode CR21 allows capacitor 1A1C31 to charge up to the peak value of the voltage present at terminal 14. This constitutes the 20 VDC supply. Its output is applied to the 11 VDC regulator (paragraph 4-114), the overload circuit, and one contact of the elapsed time meter.

4-114. Voltage divider R25-CR19-CR20 provides a stable +12.4 VDC reference for the two emitter followers (Q11 and Q10) which constitute the 11 VDC regulator. The output voltage from the regulator is normally 11.2 VDC because 0.6 VDC is lost across each silicon transistor. Resistors R34 and R35 absorb some of the power which is dissipated by the regulator circuit, allowing the transistors to run cooler than would otherwise be possible.

4-115. TEST DATA. Pertinent references and applicable test data for the 11, 20, and 28 VDC power supply are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Printed Circuit Board 1A1A5, Component and Test Point Locations, Figure 5-14.

c. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Location, Figure 5-7.

d. Radio Frequency Amplifier AM-3924(P)/URT, DC Power Control, Servicing Block Diagram, Figure 4-24.

e. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) PC Board Extender (paragraph 5-44)

f. Transistor DC Voltage Measurements, Table 5-5.

4-116. REMOTE ±12 VDC POWER SUPPLY.

4-117. GENERAL. The remote ±12 VDC power supply (figure 4-17) consists of a full wave rectifier and filter, and a two stage current amplifier regulator circuit. This circuit provides a floating regulated 12 VDC which is available at transmitter switchboard connector 1A2A1J2 for remote use.

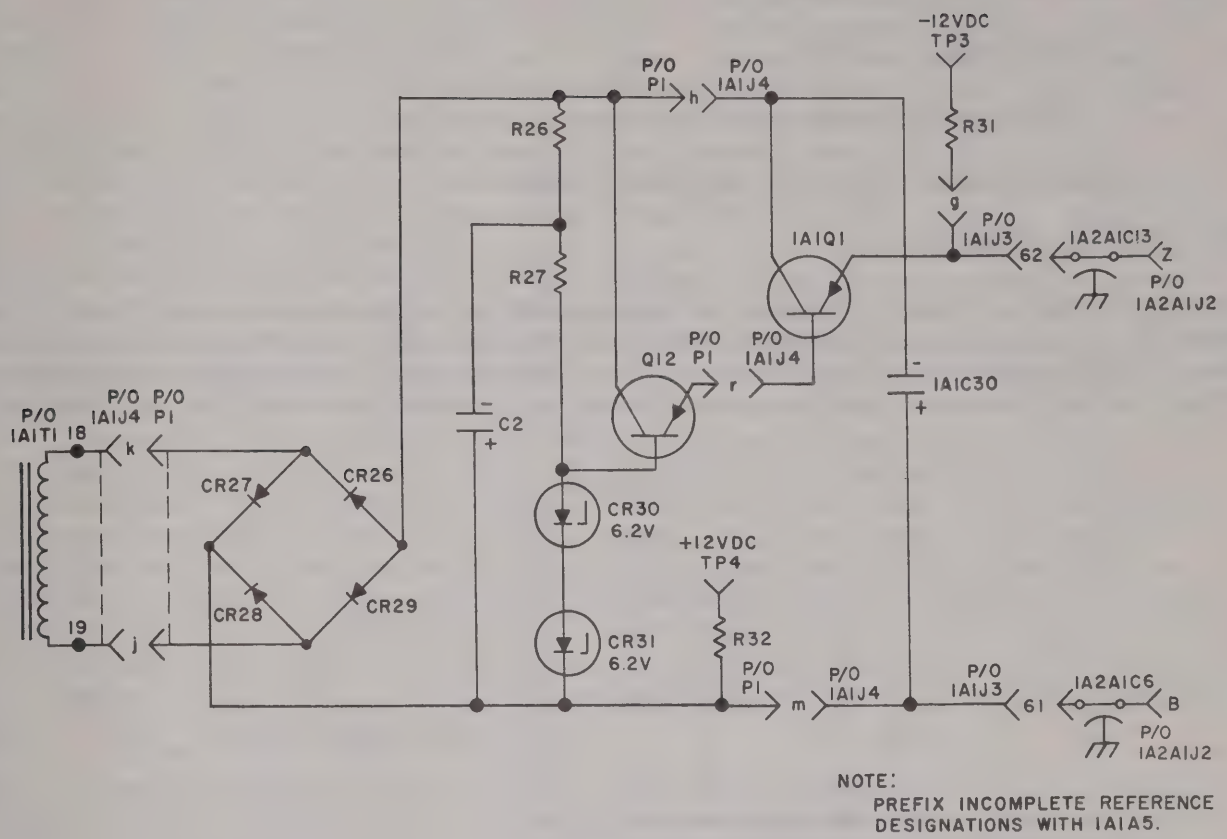


Figure 4-17. Remote ±12 VDC Power Supply, Simplified Schematic Diagram

4-118. CIRCUIT DESCRIPTION. The output from winding 18-19 of transformer 1A1T1 is fullwave rectified by diodes CR26 through CR29, filtered by capacitor 1A1C30, and applied to the voltage reference circuit (R26, R27, CR30, CR31). Zener diodes CR30 and CR31 provide a stable 12.4 VDC reference for two emitter followers (Q12 and 1A1Q1) which constitute the ±12 VDC regulator. Capacitor C2 filters the current for Zener diodes CR30 and CR31 so the reference voltage will be essentially ripple-free, thus assuring very low ripple at the regulator output.

4-119. TEST DATA. Pertinent reference and applicable test data for the remote ±12 VDC power supply are as follows:

a. Radio Frequency Amplifier AM-3924(P)/URT, Chassis, Schematic Diagram, Figure 5-23.

b. Printed Circuit Board 1A1A5, Component and Test Point Locations, Figure 5-14.

c. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component and Test Point Locations, Figure 5-7.

d. Radio Frequency Amplifier AM-3924(P)/URT, DC Power Control, Servicing Block Diagram, Figure 4-24.

e. Required Test Equipment:

(1) Multimeter AN/PSM-4

(2) PC Board Extender (paragraph 5-44)

f. Transistor DC Voltage Measurements, Table 5-5.

4-120. 60 CPS INVERTER.

4-121. GENERAL. The 60 CPS inverter (figure 4-18) is a saturable core oscillator. The function of this circuit, which forms a part of the PP-3917/UR, is to produce two single phase, 60 CPS outputs when the system is being operated from a 400 CPS primary power source; 120 VAC to power the time elapsed meter and 130 VAC to power the tuning motor.

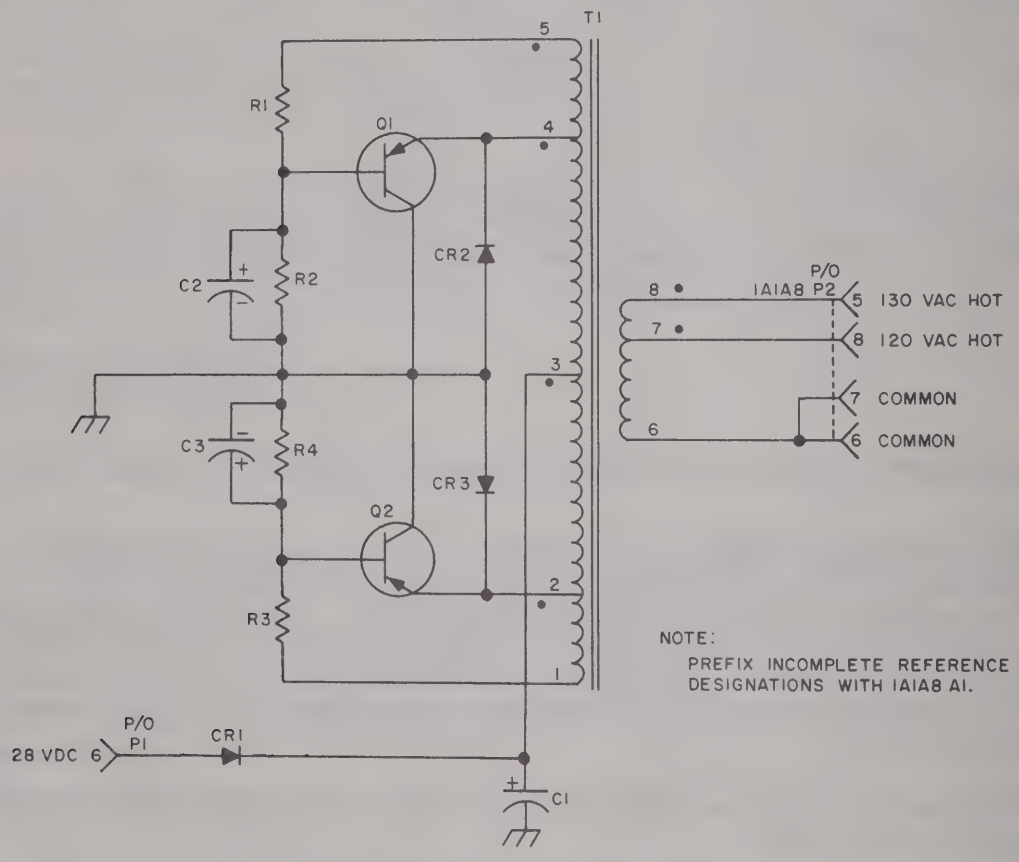


Figure 4-18. 60 CPS Inverter, Simplified Schematic Diagram

4-122. CIRCUIT DESCRIPTION. The 60 CPS inverter utilizes a saturable core transformer oscillator circuit to develop a square wave AC output from the 28 VDC input from the AM-3924(P)/URT internal power supply. When the AM-3924(P)/URT is set at standby, the 28 VDC supply is energized (paragraphs 4-99 and 4-110). This voltage is applied through peak detecting diode CR1 to the center tap of the primary winding (4-3-2) of transformer T1. Resistors R2 and R4 pull the bases of transistors Q1 and Q2 toward ground, tending to turn both transistors on. Since the two sides of the circuit are never precisely balanced, one transistor will tend to conduct more strongly than the other.

4-123. Assume that transistor Q1 is the one which conducts more strongly. This conduction induces a voltage in winding 3-4 with a polarity that makes terminal 3 more positive than terminal 4. Then by transformer action, terminal 4 is more positive than terminal 5, terminal 2 is more positive than terminal 3, and terminal 1 is more positive than terminal 2. Therefore, transistor Q2 becomes reverse biased and transistor Q1 becomes more strongly forward biased. Due to the positive feedback loop between base and emitter through feedback winding 4-5, the collector-to-emitter current flow will regeneratively increase rapidly until the transistor is driven into saturation When this occurs the primary voltage can no longer increase and a condition of quasi-stable equilibrium is maintained During this equilibrium period, the voltage drop across the transistor is small, and essentially the full 28 VDC is dropped across winding 3-4 of transformer T1. With a constant voltage across the winding, both the current and the magnetic flux increase until the core reaches saturation, a process requiring about 8.3 MSEC. At this time, the exciting current required by the transformer exceeds that which can be supplied by the transistor, so the current can rise no more. Therefore, transistor Q1 is regeneratively turned off, ending the first half cycle. As the flux in the transformer collapses, the polarity of the voltages induced in the transformer is opposite to that originally induced. Therefore, transistor Q2 becomes turned on and is regeneratively driven to saturation. Transistor Q2 then continues to conduct until the transformer core is driven into negative saturation. The flux will then again collapse, regeneratively turning transistor Q2 off and transistor Q1 back on, completing a full cycle. This switching action continues at a rate of 60 CPS, as determined by the magnetic, electrical, and dimensional characteristics of transformer T1, and the value of the supply voltage. The peak voltage from the emitter of either transistor Q1 or Q2 to ground is approximately twice the supply voltage, or 56 volts.

4-124. As the transistors turn on and off, spikes are produced in the circuit. Diodes CR2 and CR3 preclude possible transistor damage by preventing these spikes from pulling the emitters of the transistors below ground. Similarly, capacitors C2 and C3 bypass to ground any potentially damaging spikes at the bases. Resistors R1 and R3 limit the base current in transistors Q1 and Q2 to the correct value.

4-125. The AC voltage induced in the primary of transformer T1 is coupled by transformer action to the secondary. The 130 VAC developed between terminals 6 and 7 is applied to pins 5 and 6 of fanning strip P2 for connection to the tuning circuit (paragraph 4-99). The 120 VAC developed between terminals 6 and 8 is applied to pins 7 and 8 of fanning strip P2 for connection to the time elapsed meter (paragraph 4-99). When the tuning motor is energized, these voltages drop about 10% because of the heavy load imposed by the tuning motor. These voltages are higher than the 115 VAC applied during operation with a 60 CPS primary power source, since a higher peak square wave voltage is required to obtain the effects of a sine wave voltage.

4-126. TEST DATA. Pertinent references and applicable data for the 60 CPS inverter are as follows:

a. Power Supply PP-3917/UR, Schematic Diagram, Figure 5-27.

b. Power Supply PP-3917/UR, Component Locations, Figure 5-18.

c. 60 CPS inverter 1A1A8A1, Component Locations, Figure 5-19.

d. 400 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-26.

e. Required Test Equipment:

(1) Oscilloscope AN/USM-117

(2) Multimeter AN/PSM-4

f. Transistor DC Voltage Measurements, Table 5-5.

4-127. 400 CPS INVERTER.

4-128. GENERAL. The 400 CPS inverter (figure 4-19) is a saturable core oscillator. The function of this circuit, which is a part of the PP-3916/UR, is to produce a 115 VAC, 400 CPS, single phase output to power the blower and indicator lamps when operating from a 60 CPS primary power source.

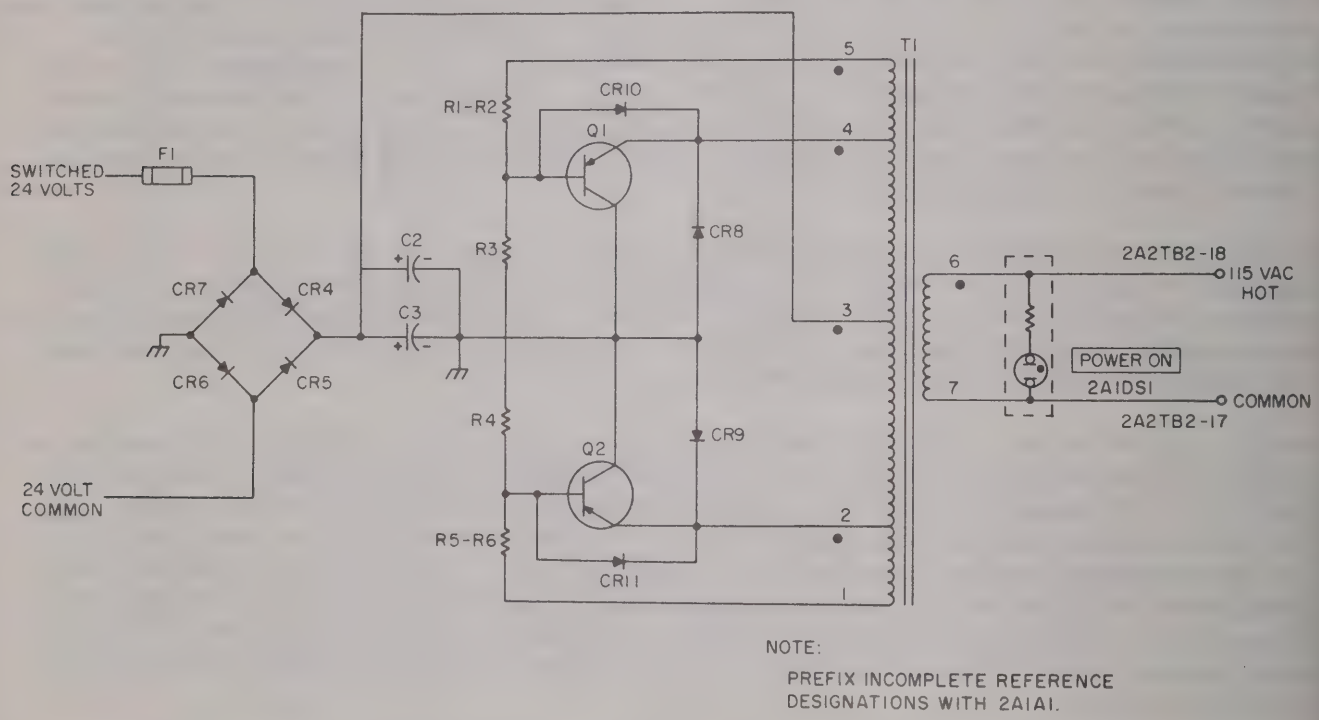


Figure 4-19. 400 CPS Inverter, Simplified Schematic Diagram

4-129. CIRCUIT DESCRIPTION. The 400 CPS inverter functions exactly like the 60 CPS inverter. When the system is placed in standby, the 24 volt output from 2A2T1 is switched through the AM-3924(P)/URT standby relay (paragraph 4-99) to full-wave rectifier bridge CR4 through CR7. The resulting 25 VDC output is filtered by capacitors C2 and C3 and applied to the center tap of transformer T1. The inverter then turns on and functions exactly like the 60 CPS inverter (paragraph 4-120). Diodes CR10 and CR11 provide protection against excessive base-to-emitter voltage. When the 400 CPS inverter turns on, POWER ON indicator lamp 2A1DS1 lights.

4-130. TEST DATA. Pertinent references and applicable data for the 400 CPS inverter are as follows:

a. Power Supply PP-3916/UR, Schematic Diagram, Figure 5-28.

b. Power Supply PP-3916/UR, Component Locations, Figure 5-20.

c. 60 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-25.

d. Required Test Equipment:

(1) Oscilloscope AN/USM-117

(2) Multimeter AN/PSM-4

e. Transistor DC Voltage Measurements, Table 5-5.

4-131. 60 CPS HIGH VOLTAGE POWER SUPPLY.

4-132. GENERAL. The 60 CPS high voltage power supply (figure 4-20) consists of a three-phase transformer, three three-phase diode blocks, and various other parts and connections. The function of this circuit is to produce the 2250 and 500 VDC required by the four electron tubes in the driver and final amplifiers when operating from a 60 CPS primary power source.

4-133. CIRCUIT DESCRIPTION. When the system is placed in an operate condition (paragraph 4-106), the three phase primary power is applied to pins A, B, and C of connector 2A2J1, from which it is routed through one of two jumpering schemes to the primary windings of transformer 2A2T1. The primary is a wye type winding of which each leg consists of two windings. The windings are jumpered together according to the magnitude of the three phase voltage. The output from transformer 2A2T1 consists of three secondary windings: two wye type and one delta type.

4-134. The output from wye winding 19-20-21 is full wave rectified by three phase diode stack CR1 to produce 500 VDC. This 500 VDC is filtered by capacitor C1, and applied through terminal 2A1TB1-14 and fuse F1 to pin M of connector 2A2J1 from which it is connected to the AM-3924(P)/URT (paragraph 4-106). The 500 VDC is used as plate voltage for the two electron tubes in the driver amplifier and as input to the screen regulator to provide screen voltage for all four final and driver amplifier electron tubes.

4-135. The output from wye winding 22-23-24 is full wave rectified by three phase diode stack CR2 to produce 1125 VDC. This 1125 VDC is used as the return for three phase diode stack CR3. The output from delta winding 25-26-27 is full-wave rectified by three phase diode stack CR3, producing an 1125 VDC that is added to the 1125 VDC output from three phase diode stack CR2. This results in the required 2250 VDC that is applied through terminal 2A1TB1-15 and pin R of connector 2A2J1 to the AM-3924(P)/URT (paragraph 4-106). This 2250 VDC is filtered slightly by capacitor 1A1C49 and is used as plate voltage for the two electron tubes in the final amplifier. A wye and delta winding are used to produce the 2250 VDC rather than a single winding since the phase relationships inherent in this combination produce one-quarter the ripple amplitude and twice the ripple frequency as compared with a single winding, thus amplifying filter requirements.

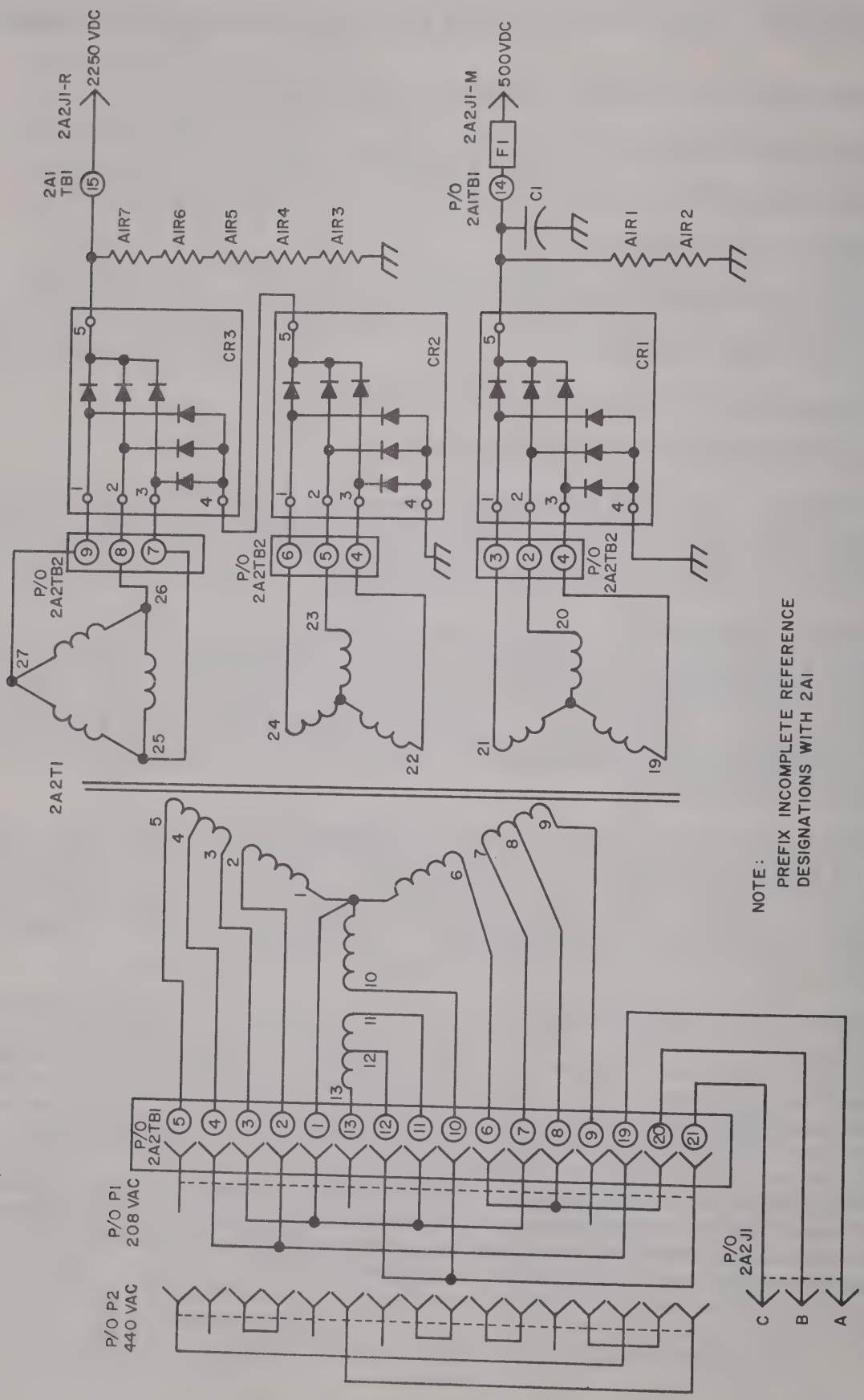


Figure 4-20. 60 CPS High Voltage Power Supply, Simplified Schematic Diagram

4-136. TEST DATA. Pertinent references and applicable data for the 60 CPS high voltage power supply are as follows:

a. Power Supply PP-3916/UR, Schematic Diagram, Figure 5-28.

b. Power Supply PP-3916/UR, Component Locations, Figure 5-20.

c. 60 CPS High Voltage Distribution, Serciving Block Diagram, Figure 4-25.

d. Required Test Equipment:

(1) Multimeter AN/PSM-4

4-137. 400 CPS HIGH VOLTAGE POWER SUPPLY.

4-138. GENERAL. The 400 CPS high voltage power supply (figure 4-21) consists of a three-phase transformer, three three-phase diode stacks, and various other parts and connections. The functions of this circuit is to produce the 2250 and 500 VDC required by the four electron tubes in the driver and final amplifiers when operating from a 400 CPS primary power source.

4-139. CIRCUIT DESCRIPTION. The 400 CPS high voltage power supply functions basically like the 60 CPS high voltage power supply. When the system is placed in an operate condition (paragraph 4-106), the three phase primary power is applied to terminals 1, 2, and 3 of 1A1TB1, from which it is routed through 1A1A8P1 to the primary winding of transformer 1A1A8T2. The output from transformer 1A1A8T2 consists of three secondary windings.

4-140. The output from secondary wye winding 10-11-12 is full wave rectified by three-phase diode stack CR3 to produce 500 VDC. This 500 VDC is filtered by capacitor C1, and applied through 1A1A8P1 to terminal 5 of 1A1TB1. The 500 VDC is used as plate voltage for the two electron tubes in the driver amplifier and as input to the screen regulator to provide screen voltage for all four final and driver amplifier electron tubes. Resistors A2R6 and A2R7 serve as a bleeder resistor.

4-141. The outputs from delta winding 4-5-6 and wye winding 7-8-9 are rectified by three-phase diode stacks CR1 and CR2 to produce 2250 VDC in the same manner done in the 60 CPS high voltage power supply (paragraph 4-135). The 2250 VDC from the rectifiers is applied through 1A1A8P1 to terminal 4 of 1A1TB1. This 2250 VDC is used as plate voltage for the two electron tubes in the final amplifier. Resistors A2R1 through A2R5 serve as a bleeder resistor.

4-142. TEST DATA. Pertinent references and applicable data for the 400 CPS high voltage power supply are as follows:

a. Power Supply PP-3917/UR, Schematic Diagram, Figure 5-27.

b. Power Supply PP-3917/UR, Component Locations, Figure 5-18.

c. 400 CPS High Voltage Distribution, Servicing Block Diagram, Figure 4-26.

d. Required Test Equipment:

(1) Multimeter AN/PSM-4

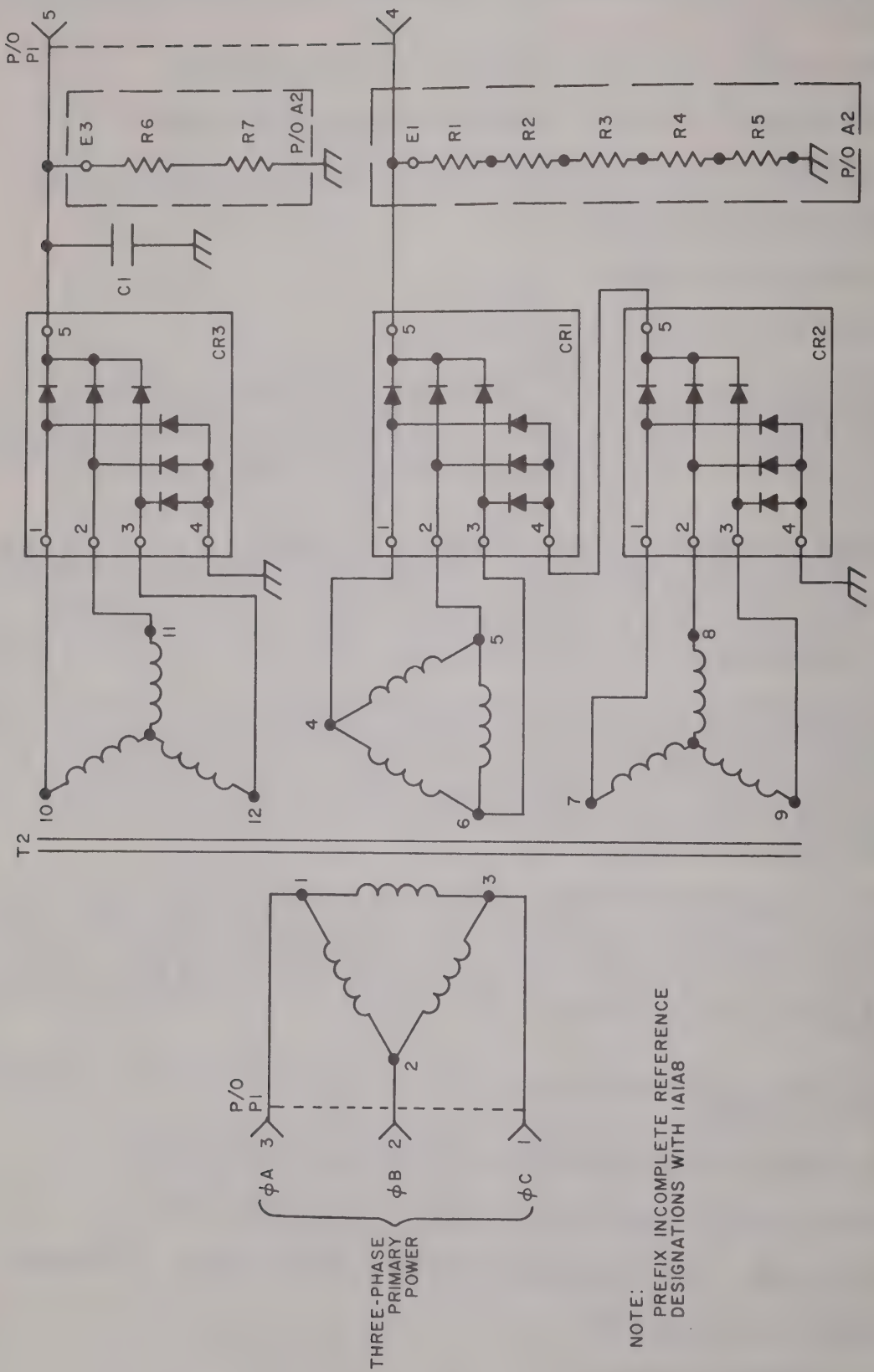


Figure 4-21. 400 CPS High Voltage Power Supply, Simplified Schematic Diagram

4-143. SYSTEM TROUBLESHOOTING

4-144. Table 4-2 is not intended to be a complete troubleshooting chart. However, it provides information that may isolate a problem area without the requirement of a detailed analysis.

TABLE 4-2. TROUBLESHOOTING

SYMPTOM	PROBABLE FAULT
No RF output; final plate current increases with increased RF input.	Short to ground or an open circuit in final transformer assembly 1A1A2.
High reflected power	1. Mistuned antenna coupler. 2. Open or shorted transmission line.
Impossible to reach 1KW output; driver current decreases with increased RF input.	1. PPC ADJ 1A1R11 or PWR control 1A1R13 misadjusted. 2. 500V 1.5A fuse in PP-3916/UR or 500 VDC 1.5A fuse in AM-3924(P)/URT open. 3. Faulty PPC circuit in T-827/URT.
Essentially no RF output; no increase in final plate current with increase in RF input.	1. Driver tube assembly 1A1A1 not properly seated, or fault in assembly. 2. Driver transformer assembly 1A1A4 not properly seated, or fault in assembly. 3. Open resistor 1A1R24.
FREQUENCY MC dial does not stop at correct position.	1. If the switch in final transformer assembly 1A1A2 also stops out of position, the coupling on driver transformer assembly 1A1A4 has slipped. 2. If the switch in final transformer assembly 1A1A2 does stop in correct position, the set screws in FREQUENCY MC dial are loose. 3. Open, shorted, or mis-wired code line between case connector 1A2A1J7 and switch S1 in driver transformer assembly 1A1A4.
System does not energize.	1. Misaligned interlock switch 1A2S1 or 1A2S2. 2. NORM-AUX switch 3A1S7 in T-827/URT set at AUX.
Motor 1A1B2 does not de-energize.	1. Shorted or miswired code line between case connector 1A2A1J7 and switch S1 in driver transformer assembly 1A1A4.

TABLE 4-2. TROUBLESHOOTING (Cont)

SYMPTOM	PROBABLE FAULT
Motor 1A1B2 does not de-energize. (Cont)	2. Coupling on driver transformer assembly 1A1A4 does not pick up the mating coupling. 3. Shorted diode 1A1A5CR2 (if antenna coupler is connected).
Can't key system from T-827/URT.	Jumper missing between pins B and D of connector 1A2A1J8.
Low RF power output.	1. Mistuned transformer assembly in driver transformer assembly 1A1A4 or final transformer assembly 1A1A2. 2. Coaxial cable between AM-3924(P)/URT and antenna coupler is not 50 ohms. 3. Misadjustment of APC and PPC circuits.
Excessive final plate current.	1. Mistuned transformer assembly in final transformer assembly 1A1A2. 2. Open coupling capacitor in final transformer assembly 1A1A2.
Low screen voltage	Diode (1A1CR3 through 1A1CR6) in screen regulator shorted.
System will not go to operate	1. Printed circuit board 1A1A5 and/or 1A1A6 not properly seated in the chassis connectors. 2. Faulty 1A1K4 3. If overload trips, then airvane switch 1A1S1, RF interlock 1A1S9, or Power supply interlock 2A1S2, 2A1S3, 2A1S4 may be faulty.

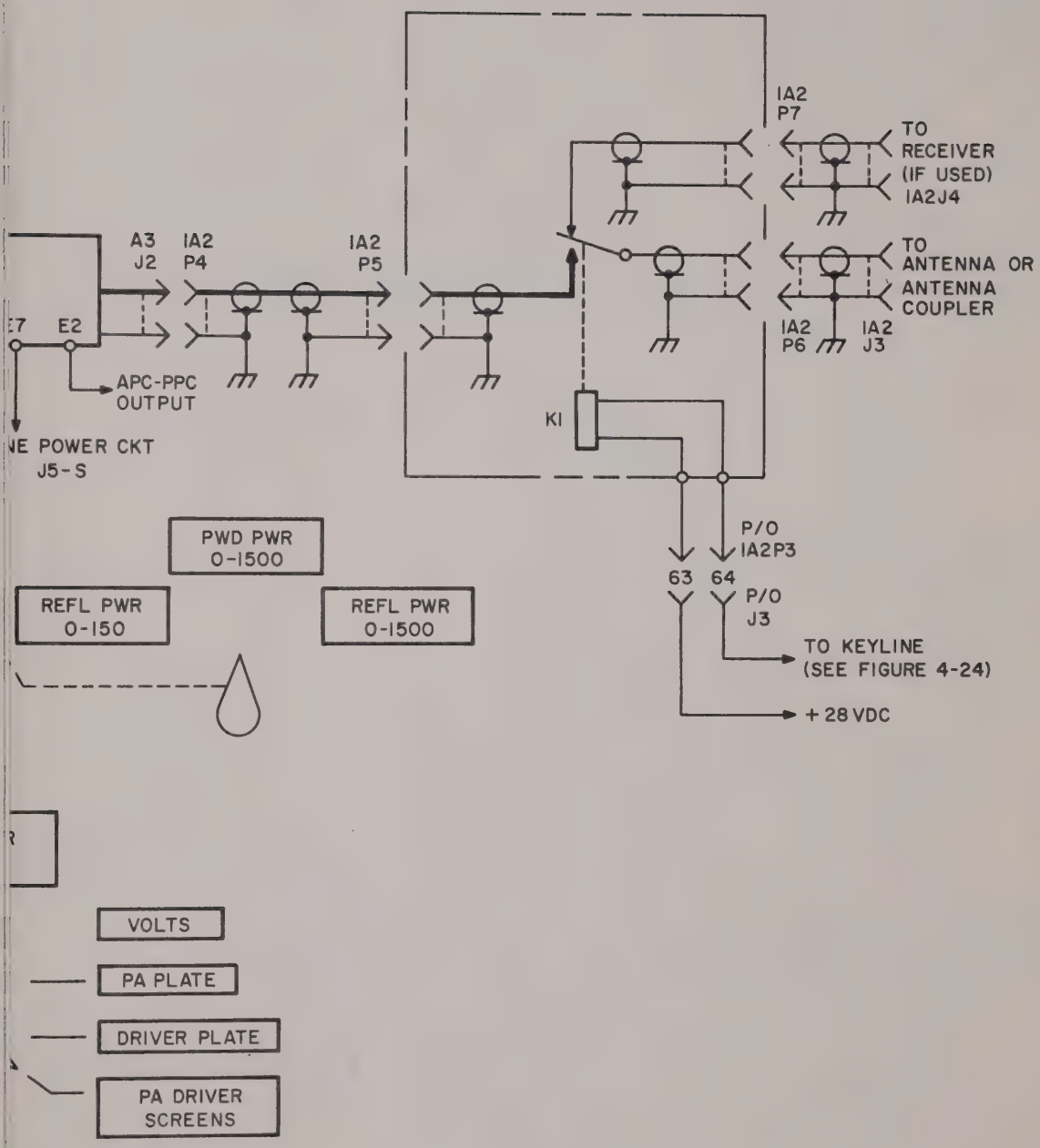


Figure 4-22. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram

TABLE 4-2. TROUBLESHOOTING (Cont)

SYMPTOM	PROBABLE FAULT
Motor 1A1B2 does not de-energize. (Cont)	2. Coupling on driver transformer assembly 1A1A4 does not pick up the mating coupling. 3. Shorted diode 1A1A5CR2 (if antenna coupler is connected).
Can't key system from T-827/URT.	Jumper missing between pins B and D of connector 1A2A1J8.
Low RF power output.	1. Mistuned transformer assembly in driver transformer assembly 1A1A4 or final transformer assembly 1A1A2. 2. Coaxial cable between AM-3924(P)/URT and antenna coupler is not 50 ohms. 3. Misadjustment of APC and PPC circuits.
Excessive final plate current.	1. Mistuned transformer assembly in final transformer assembly 1A1A2. 2. Open coupling capacitor in final transformer assembly 1A1A2.
Low screen voltage	Diode (1A1CR3 through 1A1CR6) in screen regulator shorted.
System will not go to operate	1. Printed circuit board 1A1A5 and/or 1A1A6 not properly seated in the chassis connectors. 2. Faulty 1A1K4 3. If overload trips, then airvane switch 1A1S1, RF interlock 1A1S9, or Power supply interlock 2A1S2, 2A1S3, 2A1S4 may be faulty.

NOTES:

1. Prefix incomplete reference designations with 1A1.
2. Heavy lines indicate main signal paths.
3. Letters outside transistor and tube blocks indicate element.
4. Equipment keyed, in CW mode, with 1 KW output.
5. Measurements made with AN/ISM-116.

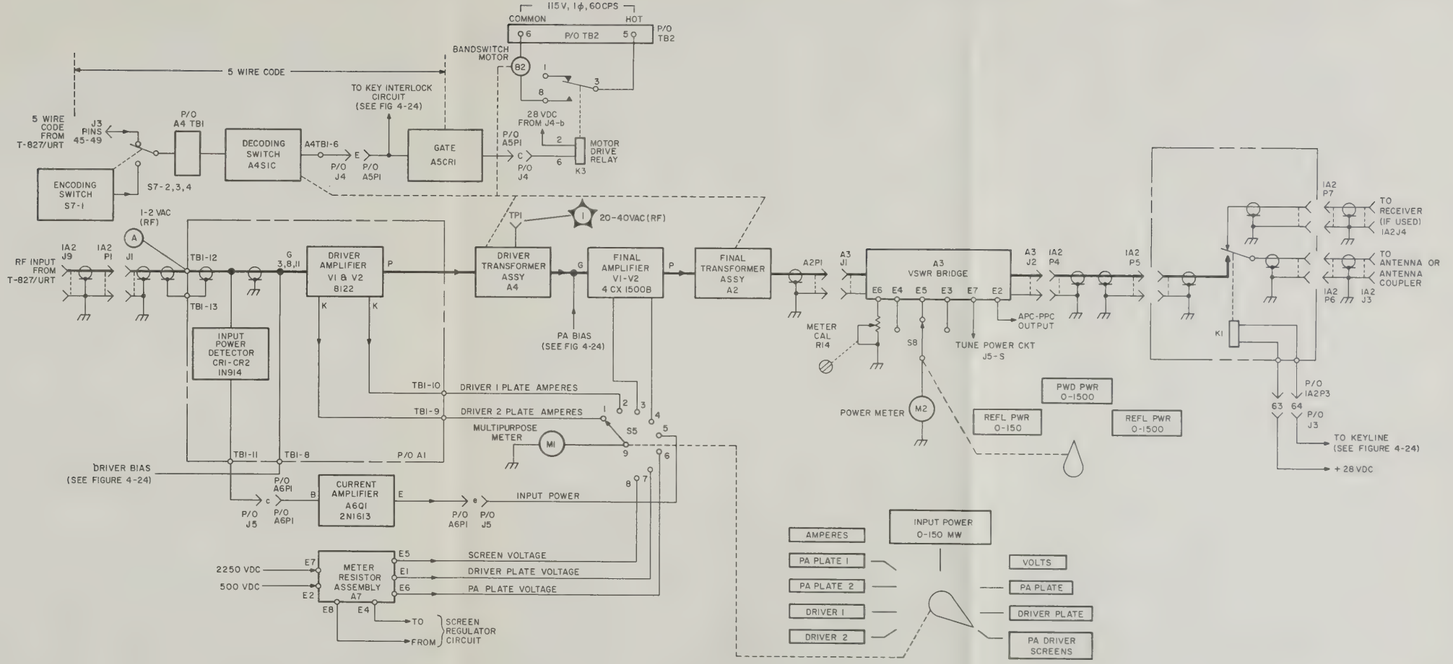


Figure 4-22. Radio Frequency Amplifier AM-3924(P)/URT, Main Signal Flow, Servicing Block Diagram

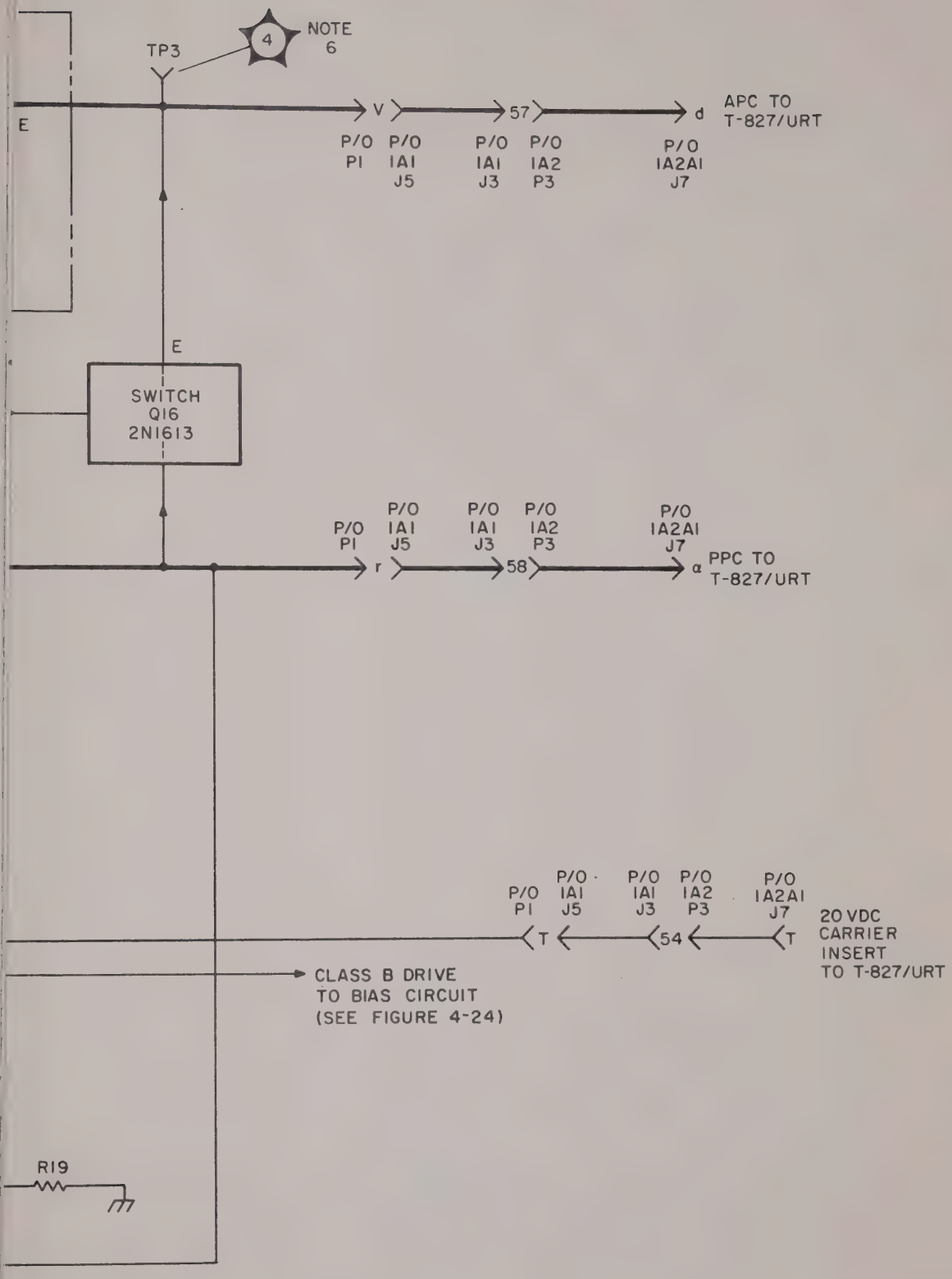


Figure 4-23. APC-PPC Circuit, Servicing Block Diagram

NOTES:

1. Prefix incomplete reference designations with 1A1A6.
2. Heavy lines indicate main signal paths.
3. Letters outside transistor blocks indicate element.
4. Equipment keyed, in CW mode, with 1 kw output.
5. Equipment keyed, 1 kw average output: 3 to 6 VDC (pulses with peaks of 9v); AM-3924(P)/URT in tune condition, 9 ± 1.0 VDC.
6. Equipment keyed, AM mode, no modulation: +4 to +5 VDC (Reading will change with frequency).
7. Equipment in standby or any operate mode except tune, unkeyed.
8. Equipment any mode except tune, 0 to 3 VDC, tune mode, 22 ± 2 VDC.
9. All measurements made with AN/USM-116.

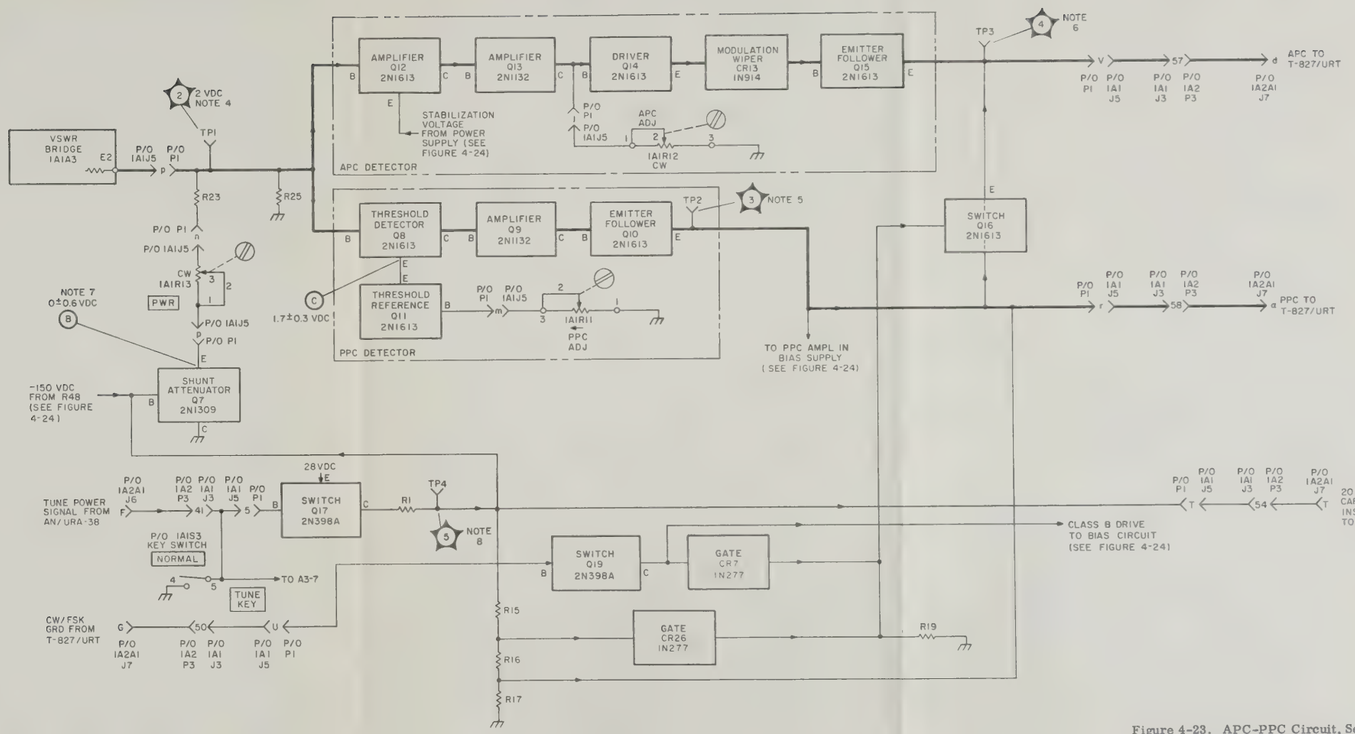


Figure 4-23. APC-PPC Circuit, Servicing Block Diagram

NOTES:

1. Prefix
2. Light l
3. Letters indicat
4. Output C-1138 A5TP4,
5. Equipm
6. Equipm
7. Equipm
8. Equipm dependi circuit VDC.
9. Equipm interloc locked,
10. Equipm 0 ± 1 VI
11. Equipm
12. Equipm no signa condition
13. All meas

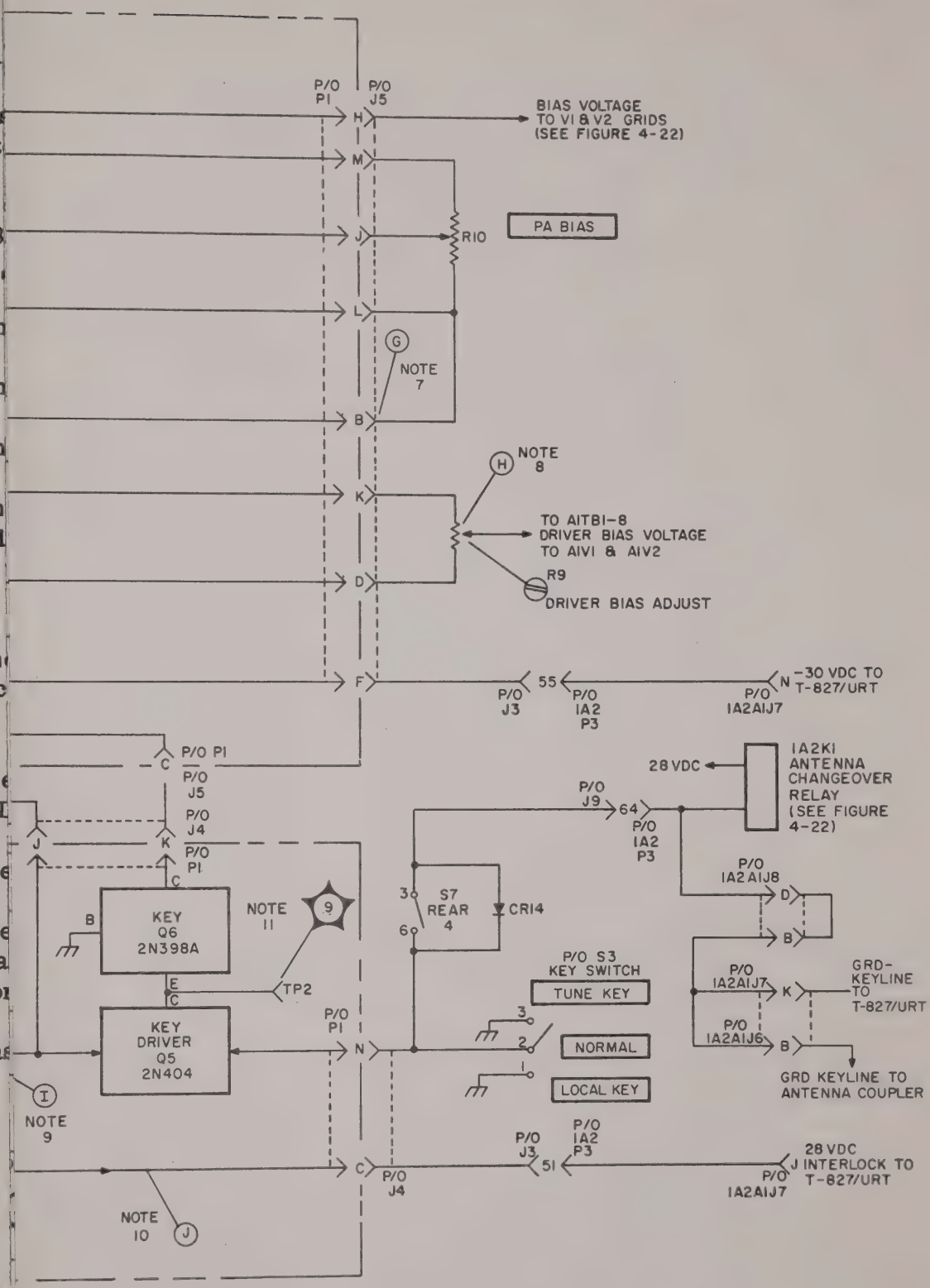


Figure 4-24. Radio Frequency Amplifier AM-3924(P)/URT, DC Power Control, Servicing Block Diagram

NOTES:

1. Prefix incomplete reference designations with 1A1.
2. Light lines indicate auxiliary or secondary signal paths.
3. Letters outside transistor blocks indicate element. Numbers on coils and transformers indicate terminal numbers.
4. Output from floating 12 volt supply T-827/URT in remote, equipment keyed from C-1138 radio set control in any operate mode, positive meter lead connected to A5TP4, negative lead connected to A5TP3, 11.8 ± 0.5 VDC.
5. Equipment in any operate mode, unkeyed, 11.2 ± 0.5 VDC.
6. Equipment in standby or any operate mode.
7. Equipment in standby or any mode: key up, -130 VDC ±20%; key down, -72 VDC ±5%.
8. Equipment in standby or operate key up, -90 ± 10 VDC; operate, key down -5 ± 2 VDC, depending on setting of R9; key down, interlocked (motor relay energized, overload circuit tripped, coupler interlock grounded, or alarm switch held at reset) -33 ± 4 VDC.
9. Equipment interlocked (motor relay energized, overload circuit tripped, coupler interlock grounded, or alarm switch held at reset), 10 ± 1 VDC; equipment not interlocked, 0.5 ± 1 VDC.
10. Equipment interlocked: by energizing motor relay or grounding coupler interlock only, 0 ± 1 VDC; otherwise, 27 ± 2 VDC.
11. Equipment in operate: key up, -97 ± 10 VDC; key down, -36 ± 2 VDC.
12. Equipment in standby or operate, unkeyed, 0 VDC; key down, in any AM or SSB mode, no signal, 1.0 ± 0.5 VDC; key down, any mode, with signal, 1.0 - 4.0 VDC; overload condition, 9.9 ± 1.0 VDC.
13. All measurements taken with AN/PSM-4.

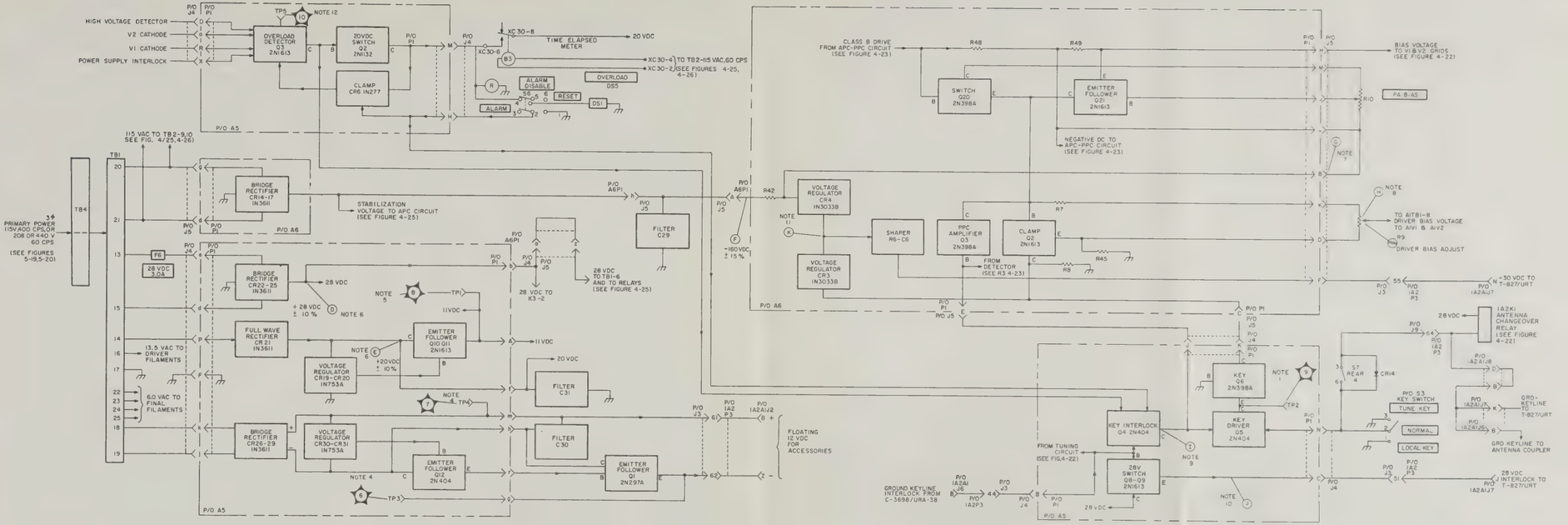


Figure 4-24. Radio Frequency Amplifier AM-3924(P)/URT, DC Power Control, Servicing Block Diagram

NOTE

1. L
   o
2. A
   A
3. T
4. M
5. E

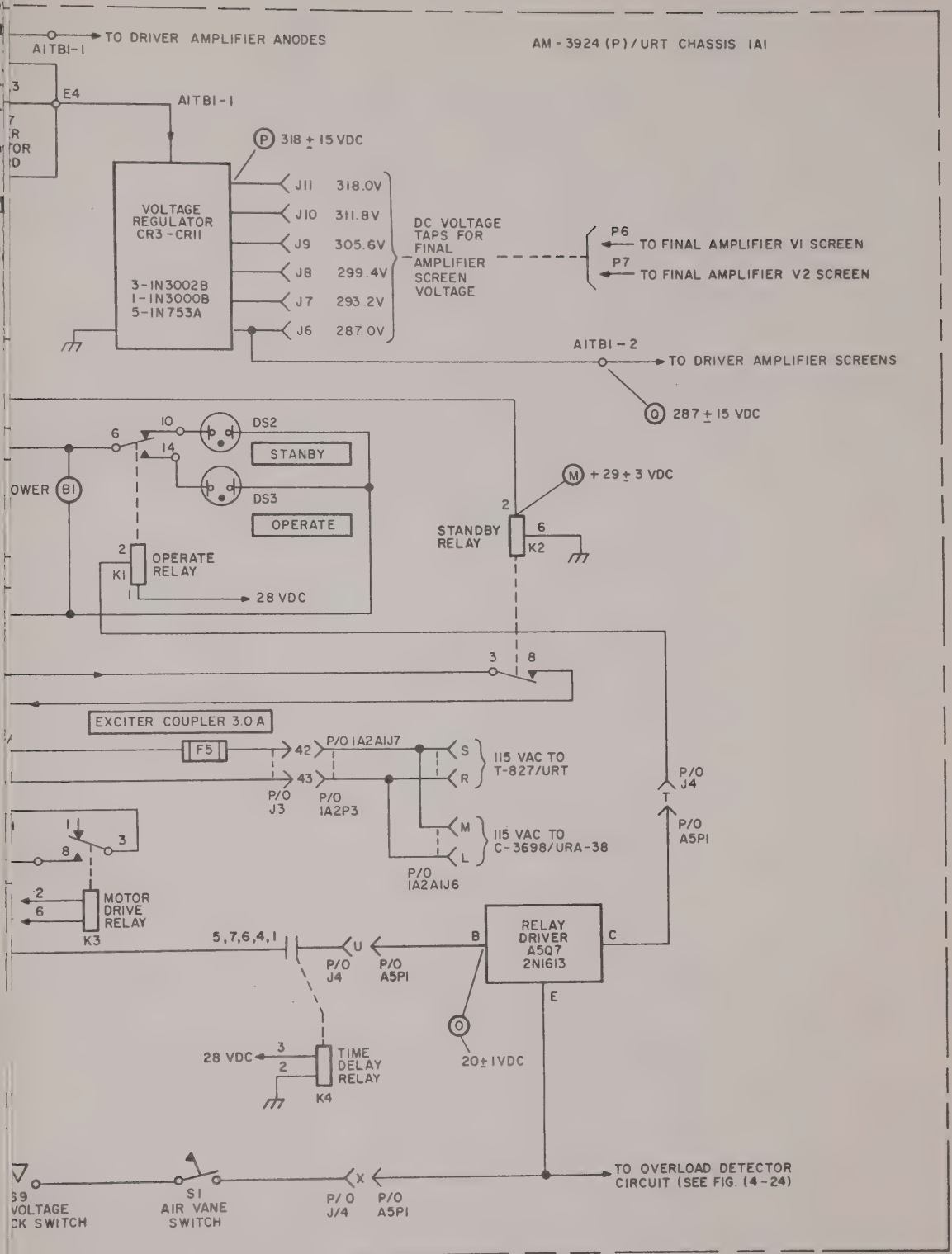


Figure 4-25. 60 CPS High Voltage Distribution, Servicing Block Diagram

NOTES:

1. Letters outside transistor blocks indicate element. Numbers on transformers and coils indicate terminal numbers.
2. All measurements except test points R, S, and T taken with AN/PSM-4 with respect to ground.
3. These measurements taken with AN/USM-117.
4. Measurements taken between indicated points.
5. Equipment in any operate mode.

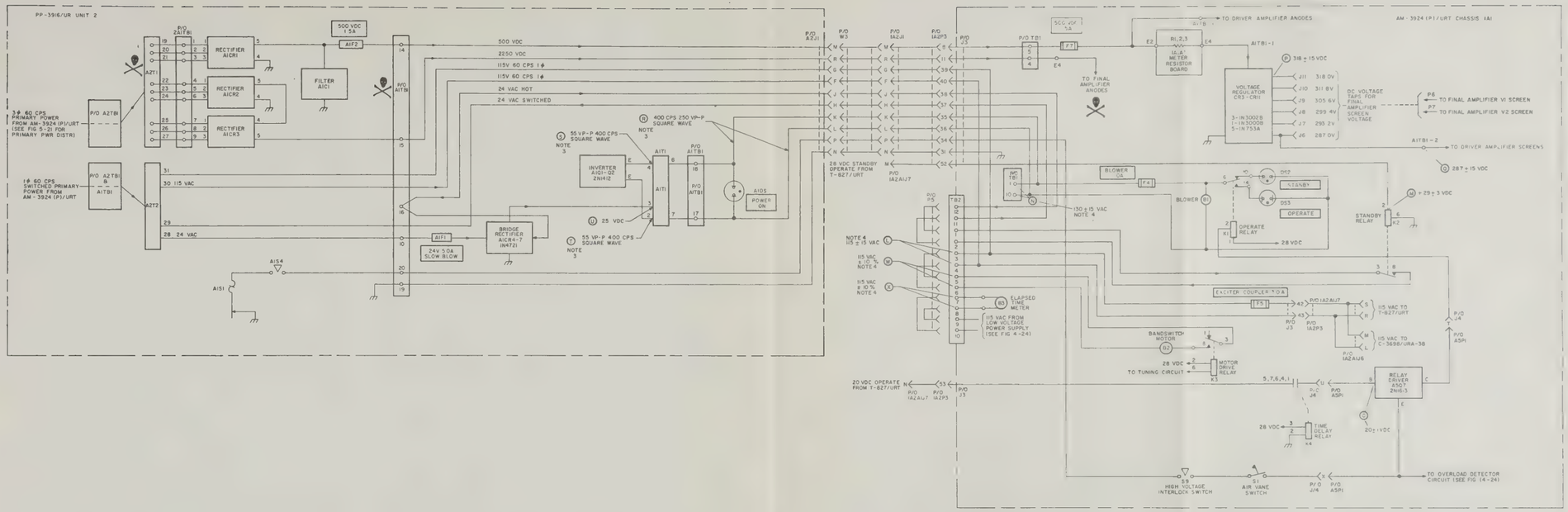


Figure 4-25. 60 CPS High Voltage Distribution, Servicing Block Diagram

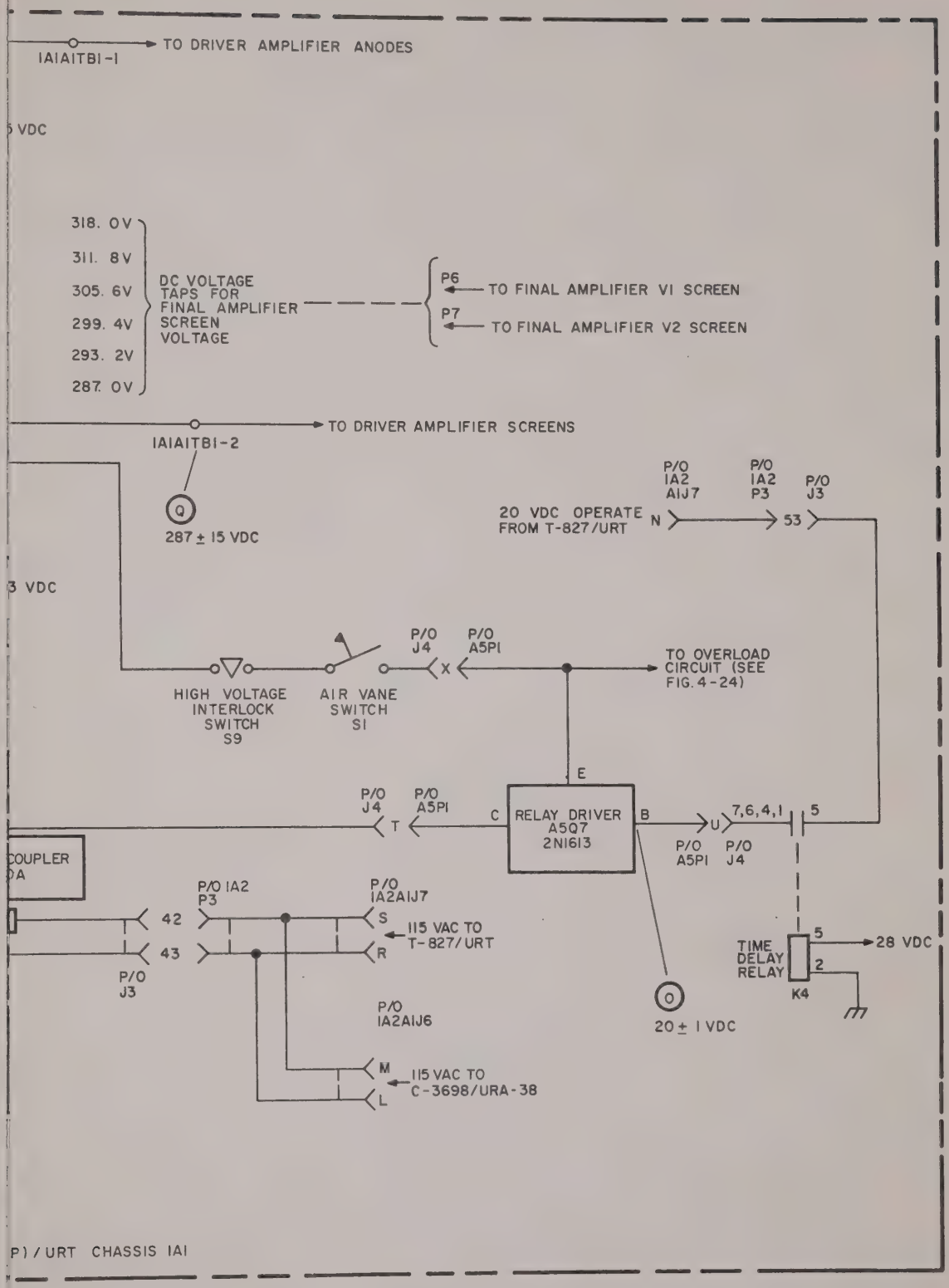


Figure 4-26. 400 CPS High Voltage Distribution, Servicing Block Diagram

NOTES:

1. Letters outside transistor blocks indicate element. Numbers on coils and transformers indicate terminal numbers.
2. All measurements taken with AN/PSM-4.
3. Measurements taken between indicated points.
4. Measurement taken with band switch motor operating.
5. AM-3924(P)/URT in any operate mode.

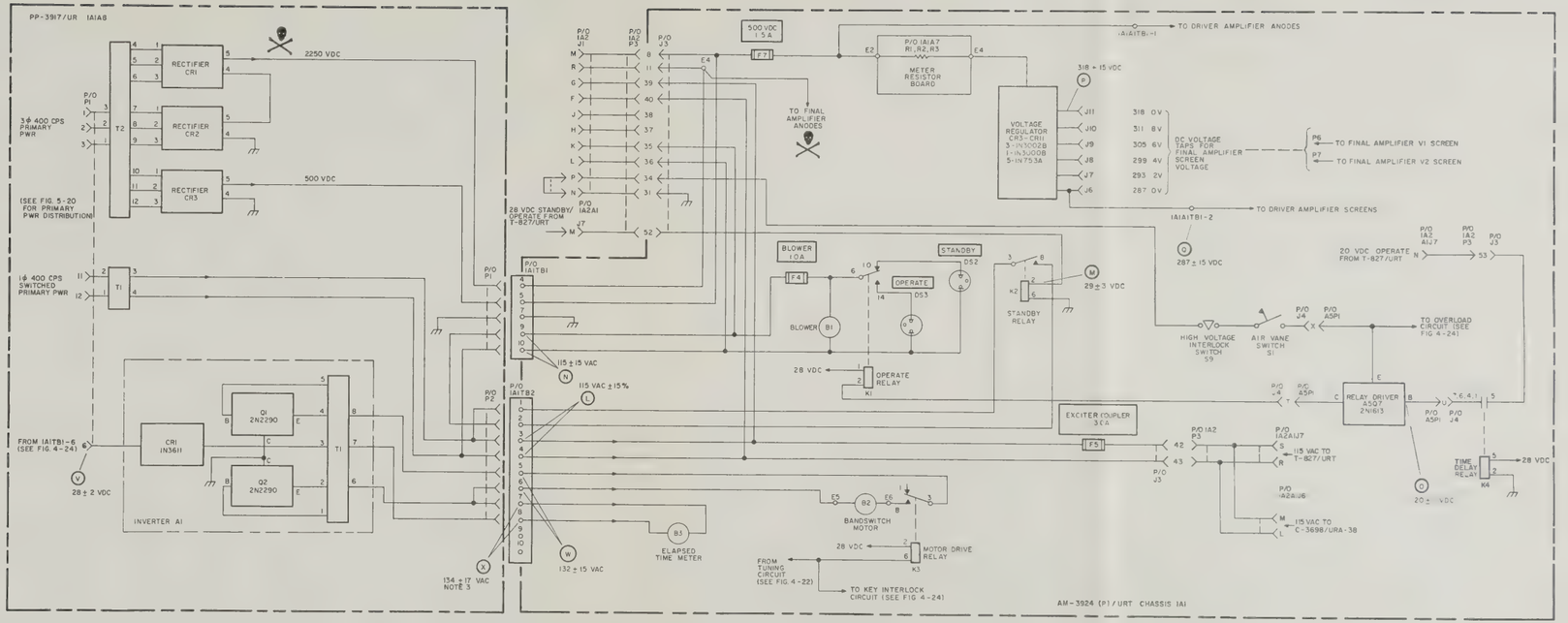


Figure 4-26. 400 CPS High Voltage Distribution, Servicing Block Diagram

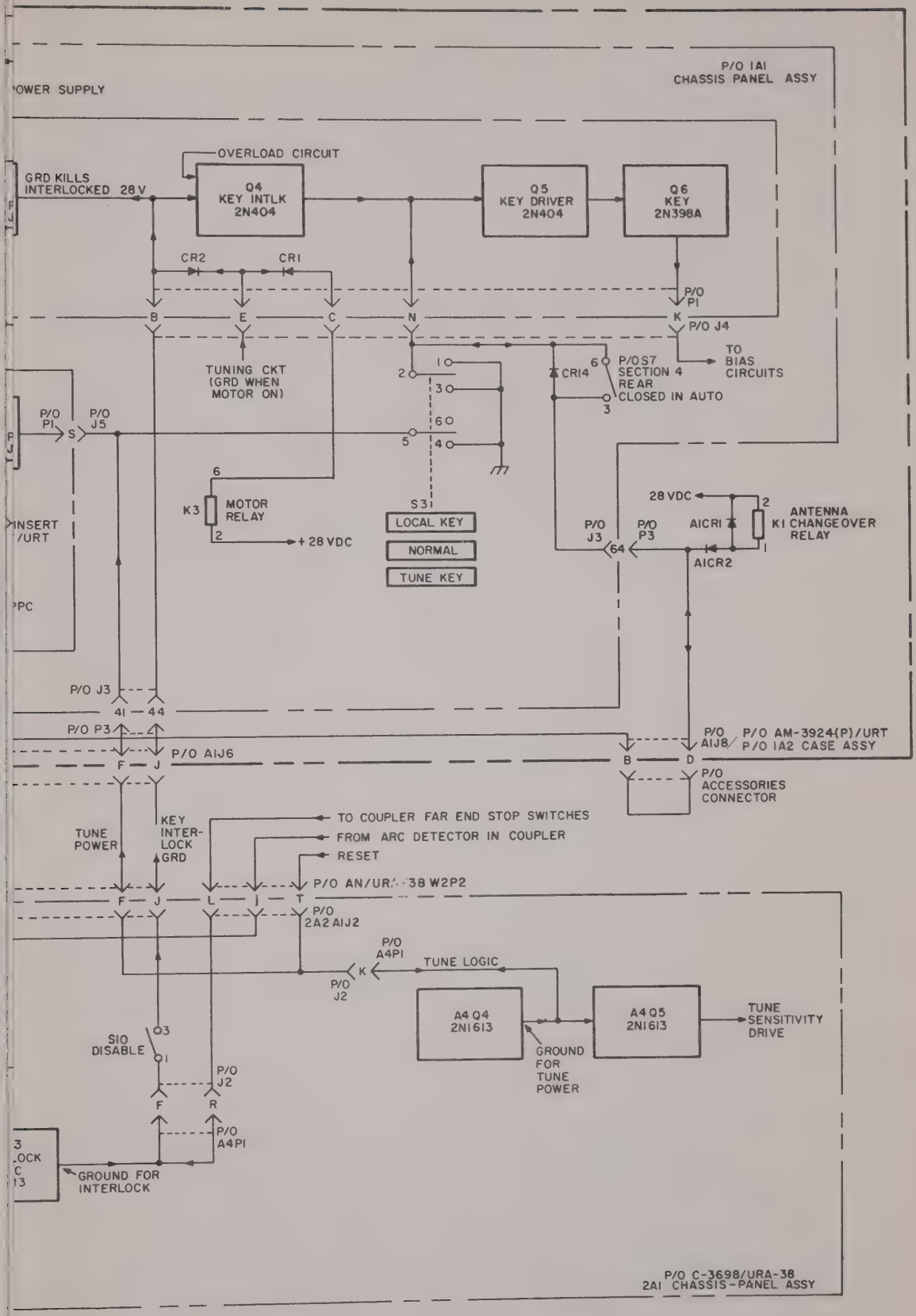


Figure 4-27. System Keying and Key Interlock Circuitry, Servicing Block Diagram

NOTES:

1. Prefix each incomplete reference designator with the number of the assembly or subassembly within which it is shown.
2. T-827/URT is unit 3 in AN/URT-23(V) system, and is shown as such here. However, the T-827/URT Technical Manual may show 2 as Ref. Desig. Prefix, or the prefix may be lacking.
3. Sections of T-827/URT rotary switches 3A2S1 and 3A2S2 are shown as pole switches for clarity.

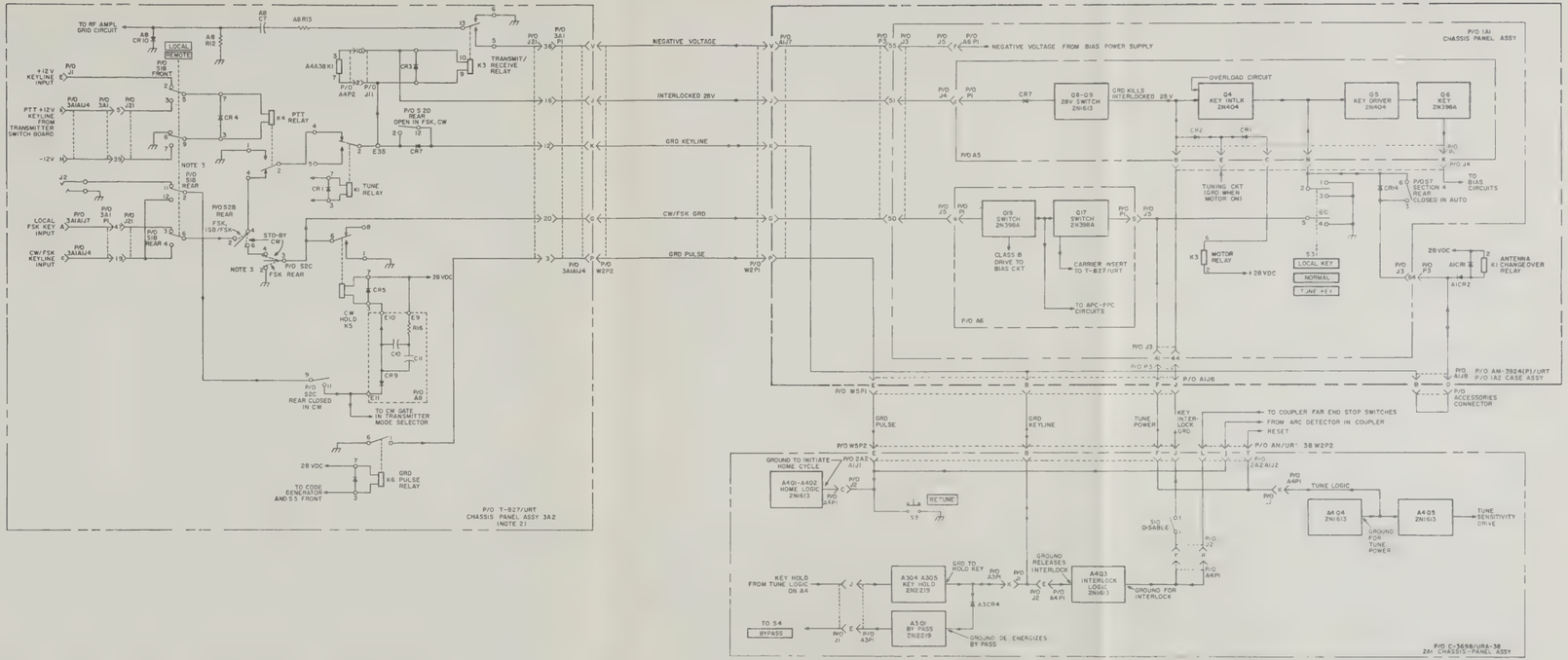


Figure 4-27. System Keying and Key Interlock Circuitry, Servicing Block Diagram

SECTION 5

MAINTENANCE

5-1. GENERAL.

NOTE

The Naval Ship Systems Command no longer requires submission of failure reports for all equipments. Failure Reports and Performance and Operational Reports are to be accomplished for designated equipments (refer to Electronics Installation and Maintenance Book, NAVSHIPS 900,000) only to the extent required by existing directives. All failures shall be reported for those equipments requiring the use of Failure Reports.

5-2. This section contains maintenance, adjustment, and parts replacement procedures for the AN/URT-23(V). For performance standards tests and preventive maintenance refer to NAVSHIPS 0967-191-7040, Reference Standards Book for Radio Transmitting Set AN/URT-23(V). Where applicable, the following procedures include interface information and instructions for the T-827/URT as part of the AN/URT-23(V). For complete maintenance and adjustment procedures for the T-827/URT, refer to NAVSHIPS 0967-032-0010, Technical Manual for Radio Transmitter T-827/URT.

5-3. TUNING AND ADJUSTMENT.

5-4. There are no adjustment procedures required for the PP-3916/UR or the PP-3917/UR. For AM-3924(P)/URT power output and meter calibration adjustments, refer to Section 2 adjustment procedures (paragraph 2-34).

5-5. DRIVER TUBES 1A1A1V1 and 1A1A1V2 BIAS ADJUSTMENT.

5-6. When the plate current of either driver tube 1A1A1V1 or 1A1A1V2 is greater than 400 milliamperes or less than 260 milliamperes while the AM-3924(P)/URT is keyed, the driver tube bias requires adjustment. To adjust the bias proceed as follows (Refer to figure 5-6 for parts location):

a. Loosen eight captive screws on front panel and slide AM-3924(P)/URT chassis out from case.

b. Defeat two interlock switches on AM-3924(P)/URT case by pulling switch plungers straight out.

c. Loosen lock nut on DRIVER BIAS ADJ 1A1R9 (figure 5-6) and set maximum CCW.

d. Set AM-3924(P)/URT PRIMARY POWER switch at ON.

e. Set T-827/URT Mode Selector switch at STD BY. Wait five minutes for AM-3924 (P)/URT to warm up.

f. Set T-827/URT Mode Selector switch at USB or LSB.

g. Set AM-3924(P)/URT Multipurpose Meter switch at DRIVER PLATE VOLTS. Multipurpose meter should indicate 500 ±50 VDC at nominal line voltage.

h. Set AM-3924(P)/URT Multipurpose meter switch at PA-DRIVER SCRNS VOLTS. Multipurpose meter should indicate 290 ±30 VDC at nominal line voltage.

NOTE

Do not speak into microphone while performing this procedure.

i. Open access door on AM-3924(P)/URT front panel and set Key switch at LOCAL KEY.

j. Set Multipurpose Meter switch alternately at DRIVER 1 AMPERES AND DRIVER 2 AMPERES and observe Multipurpose meter while slowly rotating DRIVER BIAS ADJ clockwise.

k. Set DRIVER BIAS ADJ for an indication of 320 milliamperes for tube which is indicating lowest plate current.

l. When tube indicating lowest plate current is set for 320 milliamperes, plate current of other tube should be between 300 and 400 milliamperes. If it is not, the tube is defective and should be replaced, or there is a defect in the circuit. Tighten lock nut on DRIVER BIAS ADJ.

m. Set AM-3924(P)/URT Key switch at NORMAL.

n. Set T-827/URT Mode Selector switch at OFF.

o. Set AM-3924(P)/URT PRIMARY POWER switch at OFF.

p. Release chassis slide locks and slide AM-3924(P)/URT chassis into case, securing it with eight captive screws on front panel.

5-7. POWER AMPLIFIER TUBES 1A1V1 AND 1A1V2 SCREEN VOLTAGE ADJUSTMENT.

5-8. The difference between the plate currents of AM-3924(P)/URT power amplifier tubes 1A1V1 and 1A1V2 should not exceed 40 milliamperes. When the difference exceeds 40 milliamperes, compensating adjustments in screen voltages should be made to reduce the difference, in order to maintain equal load sharing between the two tubes. To adjust the screen voltages proceed as follows:

WARNING

Lethal voltages exist within the AM-3924(P)/URT during operation. Screen voltage (300 VDC) is present at jacks J6 through J11. De-energize the equipments. Refer to NAVSHIPS 900, 000 Electronics Installation and Maintenance Book High-Voltage Adjustment Precautions before proceeding.

a. Loosen eight captive screws on front panel of AM-3924 (P)/URT and slide chassis out from case.

b. Defeat two interlock switches on AM-3924 (P)/URT case by pulling switch plungers straight out.

c. Set AM-3924 (P)/URT PRIMARY POWER switch at ON.

d. Set T-827/URT Mode Selector switch at STD BY. Wait five minutes for AM-3924 (P)/URT to warm up.

e. Set T-827/URT Mode Selector switch at USB or LSB.

f. Set AM-3924 (P)/URT Multipurpose Meter switch at PA-DRIVER SCRNS VOLTS. Multipurpose Meter should indicate 290 ±30 VDC at nominal line voltage.

g. Set AM-3924 (P)/URT Multipurpose Meter switch at PA PLATE VOLTS. Multipurpose Meter should indicate 2250 ±225 VDC at nominal line voltage.

h. Open access door on AM-3924 (P)/URT front panel and rotate PA BIAS control maximum CCW.

i. Set AM-3924 (P)/URT Key switch at LOCAL KEY.

CAUTION

Excessive plate current will damage final power amplifier tubes 1A1V1 and 1A1V2.

j. Set AM-3924 (P)/URT Multipurpose meter switch alternately at PA PLATE 1 AMPERES and PA PLATE 2 AMPERES and observe Multipurpose meter while slowly rotating PA BIAS control clockwise.

k. Set PA BIAS control so that higher of two meter indications in step j is 240 milliamperes.

l. Carefully note which final tube is drawing the higher plate current, and the difference in plate current between the two tubes.

m. Set AM-3924 (P)/URT Key Switch at NORMAL.

n. Set T-827/URT Mode Selector Switch at STD BY.

o. Locate screen voltage adjustment jacks J6 through J11 on left side of chassis (figure 5-6).

p. Observe position of two plugs coded P6 (brown) and P7 (red); screen voltage taps for tubes 1A1V1 and 1A1V2, respectively.

NOTE

Increasing the screen voltage will increase the plate current. Jacks J6 through J11 provide connections to a voltage divider network. Moving a screen voltage plug (P6 or P7) to a higher numbered jack will increase the plate current for that tube.

q. Determine which plug should be moved, from observation of relative position, compared to difference in plate current noted in step 1.

r. Move selected plug P6 or P7 to a new jack to decrease plate current which is highest, or to increase plate current which is lowest.

s. Repeat steps e and i through r until difference between plate currents is less than 20 milliamperes.

t. Repeat steps i, j and k, except set lower plate current at 240 milliamperes.

u. Set AM-3924 (P)/URT Key switch at NORMAL.

v. Set T-827/URT Mode Selector switch at OFF.

w. Set AM-3924 (P)/URT PRIMARY POWER switch at OFF.

x. Release chassis slide locks and slide chassis back into case, securing it with eight front panel captive screws.

5-9. VSWR BRIDGE 1A1A3 REFLECTED POWER OUTPUT CALIBRATION.

5-10. Capacitor 1A1A3C6 will not normally have to be readjusted to calibrate the VSWR bridge reflected power output to the Power Meter, unless the adjustment has been disturbed by circuit repairs.

5-11. TEST EQUIPMENT. The following test equipment will be required.

a. Electrical Dummy Load DA-242/U

b. Electronic Multimeter AN/USM-116

c. Signal Generator SG-582/U

5-12. INSTRUCTIONS. To calibrate the VSWR bridge for proper reflected power indications on the Power meter, proceed as follows:

a. Set AM-3924 (P)/URT PRIMARY POWER switch at OFF.

NOTE

Lethal RF voltages are present at the AM-3924 (P)/URT power output connector 1A2J3 when the AN/URT-23(V) is keyed. Ensure that the AM-3924 (P)/URT is de-energized before making cable connections.

b. Disconnect cable W8 from RF output connector 1A2J3 (figure 2-4) on rear of AM-3924(P)/URT case.

c. Connect a coaxial cable from connector 1A2J3 to DA-242/U through RF Cable Adapter UG-1447/USM-117. Connect AN/USM-116-to UG-1447/USM-117. Energize AN/USM-116 and set to measure 225 VAC.

d. Disconnect cable W1 from RF input connector 1A2J9 on rear of AM-3924 (P)/URT case.

e. Energize SG-582/U, and set it for an unmodulated RF output of approximately 0 volts at 21 MC. Connect SG-582/U to AM-3924 (P)/URT RF input connector 1A2J9.

f. Loosen eight captive screws on front panel slide AM-3924 (P)/URT chassis out from case until chassis slides lock.

g. Remove protective shield from over left side of AM-3924 (P)/URT chassis.

h. Defeat two interlock switches on front of AM-3924 (P)/URT case (figure 5-17) by pulling switch plungers straight out.

WARNING

Lethal voltages as high as 1200 VRF, 2250 VDC, and 440 VAC are present within the AM-3924 (P)/URT chassis when the system is operating. Refer to NAVSHIPS 900,000, Electronics installation and Maintenance Book High-Voltage Adjustment Procedures before proceeding.

i. Set AM-3924 (P)/URT PRIMARY POWER switch at ON.

j. Set T-827/URT Mode Selector switch at USB or LSB.

NOTE

The AM-3924 (P)/URT will automatically remain in standby during the required three minute warmup.

k. Jumper 1A1A6TP1 (Brown) to chassis ground.

l. Set T-827/URT MCS AND KCS controls at 21.000 MC. Observe that AM-3924 (P)/URT FREQUENCY MC dial rotates until 20 to 22 is indicated in window.

m. Set AM-3924 (P) /URT Key Switch at LOCAL KEY.

n. Carefully set output of SG-582/U for an indication of 223.6 ±1 VAC on AN/USM-116.

o. Rotate and hold AM-3924 (P)/URT Power meter switch at REFL PWR 0-150.

p. Insert a nonmetallic screwdriver through access hole in VSWR bridge assembly (figure 5-6). and carefully adjust 1A1A3C6 (BAL TRIMMER) for minimum indication on Power meter.

q. Release AM-3924 (P)/URT Power meter switch (it will reset to FWD PWR 0-1500) and remove screwdriver from 1A1A3C6.

r. Slowly adjust AM-3924(P)/URT METER CAL potentiometer 1A1R14 (figure 5-6) until Power Meter indicates 1 KW. (Ensure that AN/USM-116 still indicates 223.6 ±1 VAC when performing this step.)

s. Set AM-3924(P)/URT Key switch at NORMAL.

t. Remove jumper from 1A1A6TP1.

u. Set T-827/URT Mode Selector switch at OFF.

v. Set AM-3924(P)/URT PRIMARY POWER switch at OFF.

w. Disconnect SG-582/U and reconnect cable W1 to AM-3924(P)/URT connector 1A2J9.

x. Disconnect DA-242/U and reconnect cable W8 to AM-3924(P)/URT connector 1A2J3.

y. Release chassis slide locks and slide AM-3924(P)/URT chassis back into case, securing it with eight captive front panel screws.

5-13. CHAIN DRIVE ADJUSTMENT.

NOTE

If PP-3917/UR is used, it must first be removed before performing the procedure below.

5-14. To tighten the AM-3924(P)/URT chain drive proceed as follows:

a. Loosen eight captive front panel screws and slide chassis out from case.

b. Release chassis slide tilt locks and tilt chassis up to expose underside.

c. Locate two Phillips head screws which secure chain drive bracket assembly to main chassis, directly behind front panel (figure 5-8).

d. Loosen two screws.

e. Push bracket toward front panel to increase tension on chain.

CAUTION

The chain should be tight enough to eliminate all backlash. However, too much tension on the chain drive will cause excessive wear to the chain drive mechanism.

f. While maintaining light tension on chain drive bracket assembly, tighten two screws securing assembly to main chassis.

g. Inspect chain and sprockets for signs of wear. Lubricate with Hi-Lo Temperature Grease per MIL-C-3278.

NOTE

Reinstall the PP-3917/UR if it was removed at the beginning of the procedure.

h. Release chassis tilt locks and return chassis to a horizontal position.

i. Release chassis slide locks and slide chassis back into case, securing with eight captive front panel screws.

5-15. RADIO FREQUENCY AMPLIFIER AM-3924(P)/URT ALIGNMENT

5-16. Complete alignment of the AM-3924(P)/URT consists of tuning the driver and final transformer assemblies. These procedures must be performed whenever rated power output can not be obtained or excessive plate current is noted on any one (or more) frequency band which is not due to aging tubes or component failure. The waveform for each band will assume one of the configurations shown in figure 5-1. A properly aligned coil will generally have the frequency markers for the high and low ends of the band situated at equal amplitudes on the response curve, with maximum flatness between the markers except where shown differently on the waveforms.

5-17. TEST EQUIPMENT. Test equipment required for alignment of the AM-3924(P)/URT is as follows:

a. Radio Test Set AN/TRM-3 with Video Transfer Oscillator AN/URM-153 (or an equivalent sweep generator capable of 5 MC sweep bandwidth from 1 to 35 MC, 0.5 VRF output, and multiple markers at 0.5, 1.0, and 5.0 MC intervals throughout the range).

b. Electrical Dummy Load DA-242/U

c. Detector Test Fixture (paragraph 5-18).

d. Alignment tool.

5-18. DETECTOR TEST FIXTURE. A small detector network will be required during alignment of the AM-3924(P)/URT. Figure 5-2 shows the components. Use one-quarter watt composition resistors, and ceramic or mica capacitors rated at or above 50 volts. The parts should be mounted on a surface no larger than 1/2 inch by 3/4 inch, and connected with leads not exceeding 1/4 inch.

5-19. DRIVER TRANSFORMER ALIGNMENT INSTRUCTIONS. The driver transformer assemblies for the nineteen frequency bands are arranged on sixteen coil forms. Figure 5-25 illustrates the schematic representation of the coils, while table 5-1 lists the frequencies covered by each band. To align the coils for any one band proceed as follows:

a. Loosen eight captive front panel screws and slide AM-3924(P)/URT chassis out from case until slides lock. Release chassis slide tilt locks and tip chassis up to expose underside.

b. Disconnect 1A2P1 (RF input) from 1A1J1 on rear of AM-3924(P)/URT chassis.

c. Disconnect 1A2P4 (RF output) from 1A1A3J2 on rear of AM-3924(P)/URT chassis. Connect DA-242/U to 1A1A3J2.

d. Note position of P6 and P7, in jacks J6-11 at left rear of chassis, then unplug P6 and P7, so that final power amplifier stage will be inoperative during alignment of driver coils.

e. Connect output of AN/TRM-3 and AN/URM-153 to 1A1J1 on rear of AM-3924(P)/URT chassis.

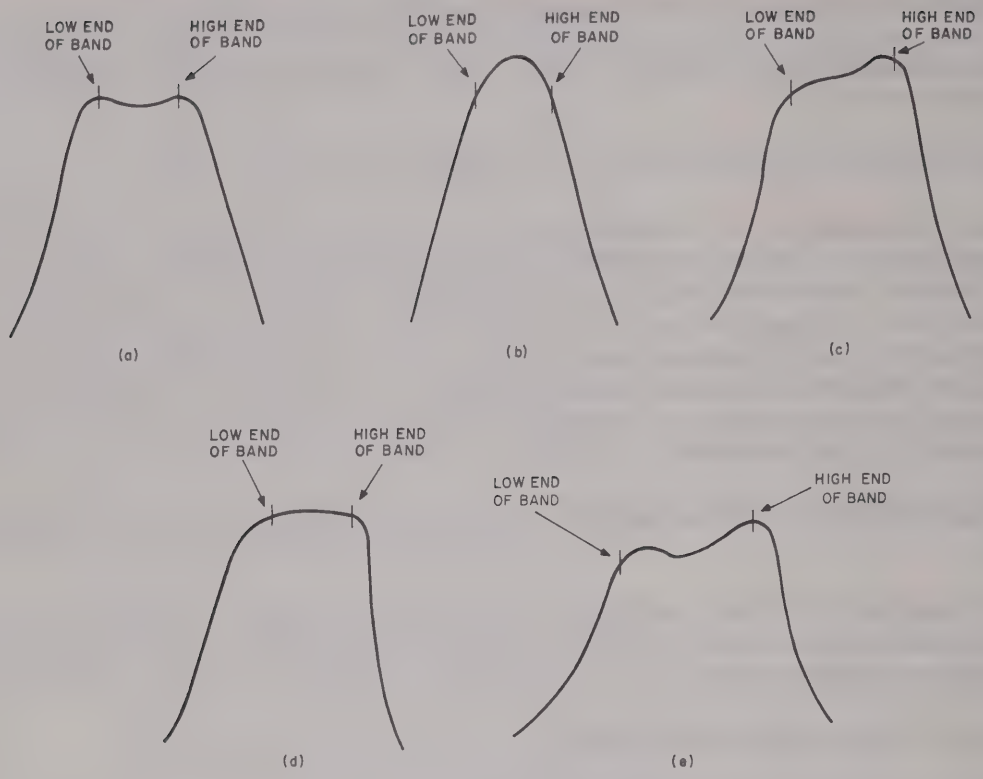


Figure 5-1. Alignment Waveforms

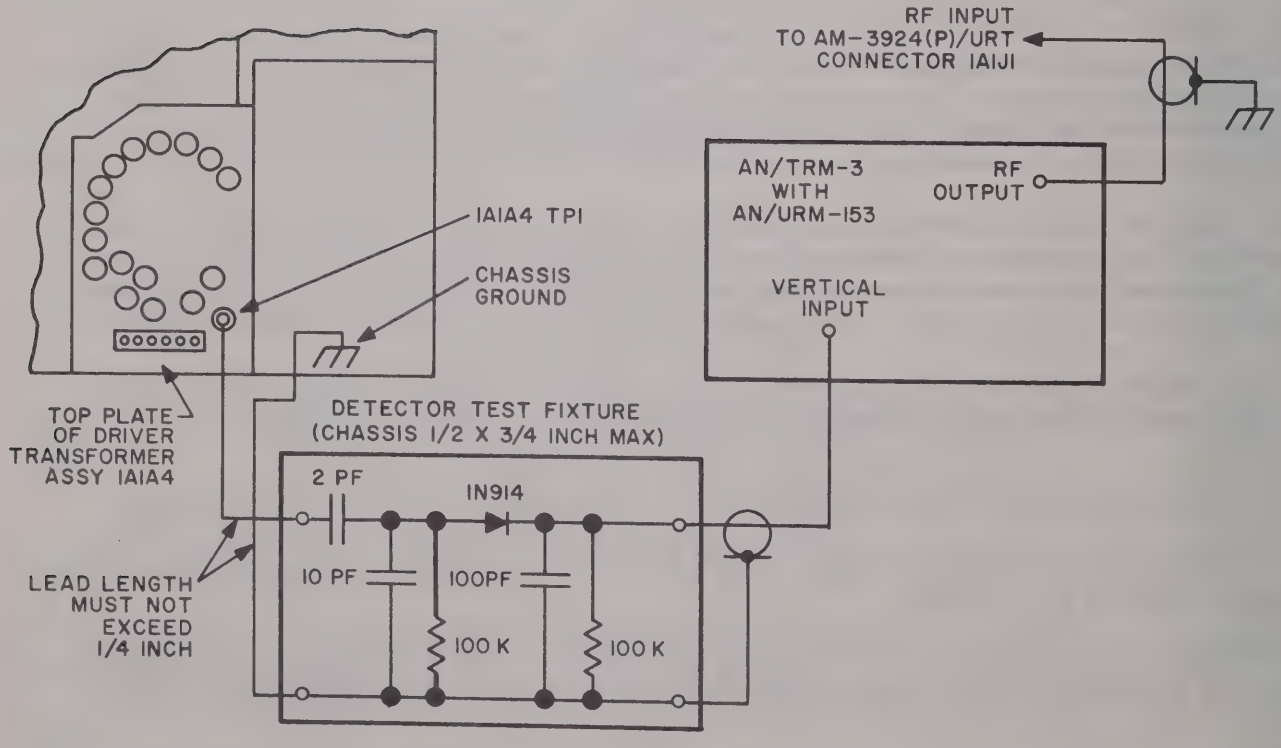


Figure 5-2. Alignment Test Setup Diagram

f. Connect test fixture fabricated in paragraph 5-18 as shown in figure 5-2.

g. Defeat two interlock switches on front of AM-3924(P)/URT case by pulling switch plungers straight out (figure 5-17).

h. Set AM-3924(P)/URT PRIMARY POWER switch at ON.

i. Set T-827/URT Mode Selector switch at USB or LSB.

j. Turn on all test equipment and allow fifteen minutes for warmup.

k. For bands 1 and 2, one coil, mounted on a separate coil form, is used for each band (table 5-1). To align band 1 or 2, perform steps n through aa below.

l. For bands 3 through 8, one coil is used for each band, but two coils are mounted on each coil form. Refer to table 5-1 to determine which coil on which coil form is to be aligned, and align that coil according to steps n through aa below, without disturbing alignment of other coil on form.

m. Coil assemblies for bands 9 through 19 are over-coupled double-tuned circuits with both coils mounted on same form. Refer to table 5-1 to determine which coil form is to be aligned and align both coil L1 and L2 by performing steps n through aa below. For each band align coil L1 first (coil nearest end where alignment tool is inserted).

n. Set T-827 MC and KC controls at center frequency of band to be aligned. Observe that AM-3924(P)/URT FREQUENCY MC dial rotates until frequency range of band to be aligned is centered in window.

o. Set AM-3924(P)/URT Key switch at LOCAL KEY.

p. Set AN/TRM-3 and AN/URM-153 to sweep band to be aligned, with approximately 0.5 volts RF output.

q. Insert marker frequencies for center and high and low ends of band to be aligned as indicated in table 5-1.

r. Carefully align coil(s) until markers for high and low ends of band are in position on AN/TRM-3 waveform pattern shown in figure 5-1.

s. Set AM-3924(P)/URT Key switch at NORMAL.

t. If more than one coil form is to be aligned, refer to step k, l, or m to determine coil form number, then repeat steps n through s before proceeding.

u. When all necessary alignments have been made, disconnect AN/TRM-3 and AN/URM-153, and DA-242/U.

v. Disconnect test fixture from Driver Transformer assembly test point 1A1A4TP1.

w. Set AM-3924(P)/URT Key Switch at NORMAL. Set T-827/URT Mode Selector switch at OFF.

x. Replace P6 and P7 in jacks from which they were removed in step d.

y. Reconnect AM-3924(P)/URT RF input cable connector 1A2P1 to 1A1J1.

z. Reconnect RF output cable connector 1A2P4 to 1A1A3J2 on rear of AM-3924(P)/URT chassis.

aa. Release chassis tilt locks and return chassis to horizontal position. Release chassis slide locks and slide chassis back into case, securing it with eight captive screws on front panel.

5-20. FINAL TRANSFORMER ALIGNMENT INSTRUCTIONS. The final transformer assemblies for the nineteen frequency bands are arranged on nineteen coil forms (figure 5-24). Frequency bands 1 and 2 both use coil forms 1 and 2 connected in series, and frequency bands 3 and 4 both use coil forms 3 and 4 connected in series. The coils for the remaining fifteen bands are arranged on fifteen separate forms, with two coils on each form providing a double-tuned circuit for each band (table 5-1). The slug tuned coils are aligned from the top of the form. The adjustment for the coil on the top of each form (coil L1) is color coded blue for identification. To align the coils proceed as follows:

a. Loosen eight captive front panel screws and slide AM-3924(P)/URT chassis out from case until slides lock.

b. Disconnect 1A2P1 from 1A1J1 (RF input) on rear of AM-3924(P)/URT.

c. Disconnect 1A2P4 from 1A1A3J2 (RF output) on rear of AM-3924(P)/URT chassis.

d. Set AM-3924(P)/URT DRIVER BIAS ADJ 1A1R9 (figure 5-6) maximum CCW so that driver stage will be inoperative during alignment procedure.

e. Connect output from AN/TRM-3 and AN/URM-153 between test point 1A1A4TP1 (figure 5-13) on driver transformer assembly and chassis ground. Connect a 50-ohm resistor from 1A1A4TP1 to chassis ground. Resistor and cable leads should be 1/2 inch or less.

f. Connect dummy load DA-138/TRM-3 to 1A1A3J2.

g. Set AM-3924(P)/URT PRIMARY POWER switch at ON.

h. Set T-827/URT Mode Selector switch at USB or LSB.

i. Turn on all test equipment and allow fifteen minutes for warmup.

j. Set AN/TRM-3 and AN/URM-153 for approximately 0.5 volts RF output.

k. Insert RF Coupler-Detector CU-506/TRM-3 between 1A1A3J2 and DA-138/TRM-3. This step must be performed after OPERATE lamp DS3 has come on; otherwise high voltage pulse associated with high voltage turn-on may burn out diode in CU-506/TRM-3.

l. Final transformer assemblies for bands 1 and 2 are mounted on coil forms 1 and 2 and must be aligned together. Similarly, bands 3 and 4 are mounted on coil forms 3 and 4 and must be aligned together. To align bands 1 and 2 or 3 and 4, proceed as follows:

(1) Set T-827/URT KC and MC controls for center frequency of higher of two bands to be aligned according to table 5-1 (i.e., 2.750 MC or 3.750 MC).

(2) Set AM-3924(P)/URT Key switch at LOCAL KEY.

(3) Set up AN/TRM-3 and AN/URM-153 to sweep higher of two frequency bands to be aligned.

(4) Insert marker frequencies as indicated for higher band according to table 5-1.

(5) Turn blue color coded adjustments on A2 (or A4) and uncoded adjustment on A1 (or A3) until waveform conforms to one indicated on figure 5-1 and table 5-1.

(6) Set AM-3924(P)/URT Key switch at NORMAL.

(7) Set T-827/URT MC and KC controls for center frequency of lower band (i.e. 2.250 MC or 3.250 MC).

(8) Set up AN/TRM-3 and AN/URM-153 to sweep lower band.

(9) Insert marker frequencies for high and low ends of band as indicated in table 5-1.

(10) Set AM-3924(P)/URT Key switch at LOCAL KEY.

(11) Tune blue colored adjustment on A1 (or A3) until waveform conforms with waveform shown in figure 5-1c.

(12) Set AM-3924(P)/URT Key switch at NORMAL.

(13) Repeat steps (1) through (12) above until best compromise is obtained between two bands.

(14) If no other final plate transformer assemblies are to be aligned, skip step m.

m. Coil forms 5 through 19, for frequency bands 5 through 19 (table 5-1), each contain two coils which form an over-coupled double-tuned circuit. To align any one of these bands proceed as follows:

(1) Set T-827/URT KC and MC controls for center frequency of band to be aligned.

(2) Set AM-3924(P)/URT Key switch at LOCAL KEY.

(3) Set up AN/TRM-3 and AN/URM-153 to sweep band to be aligned.

(4) Insert marker frequencies at high and low ends of band to be aligned as called out in table 5-1.

NOTE

On the top of the coil forms, the primary coil adjustment is color coded blue; the secondary coil adjustment has no color coding.

(5) Tune coil form primary and secondary until markers for high and low ends of band are in positions shown, and waveform conforms to waveform shown in figure 5-1 for that frequency band, as called out in table 5-1.

(6) Set AM-3924(P)/URT Key switch at NORMAL.

n. Remove CU-506/TRM-3 and reconnect DA-138/TRM-3 directly to prevent damage to diode in CU-506/TRM-3 when high voltage is turned off.

o. Set T-827/URT Mode Selector switch at STD BY.

p. Disconnect AN/TRM-3 and AN/URM-153.

q. Remove the resistor from 1A1A4TP1.

r. Remove DA-138/TRM-3 and connect 1A2P4 to 1A1A3J2 on rear of AM-3924(P)/URT chassis.

s. Connect 1A2P1 to 1A1J1 on rear of AM-3924(P)/URT chassis.

t. Refer to paragraph 5-5 and perform driver tubes 1A1A1V1 and 1A1A1V2 bias adjustment starting with step f.

u. Disassemble remaining parts of test setup.

5-21. REPAIRS.

5-22. GENERAL PARTS REPLACEMENT TECHNIQUES.

5-23. There are no special procedures required for removal and replacement of any of the major assemblies of the AM-3924(P)/URT, nor are special instructions required for the removal of component parts from either the PP-3916/UR or the PP-3917/UR. Instructions for removal and replacement of assemblies and component parts within the T-827/URT are contained in NAVSHIPS 0967-032-0010, Technical Manual for Radio Transmitter T-827/URT.

NOTE

If either transformer 2A2T1 of 2A2T2 requires replacement, the complete transformer and case assembly must be replaced. Remove the components from the discarded assembly and install them on the new transformer and case assembly.

5-24. The socket-mounted electrolytic capacitors 1A1C29, 1A1C30, and 1A1C31, the elapsed time meter, and front panel mounted components on the AM-3924(P)/URT will be more accessible if the front panel is loosened. The front panel is secured to the chassis by three machine screws on each side and one in center of panel. If the top two machine screws on each side and one screw in panel center are removed, and the bottom ones loosened, the panel can be tipped forward slightly.

CAUTION

If all six mounting screws are removed and the front panel is allowed to hang without other support the chain and the interconnecting wires may be snapped.

5-25. To obtain access to power amplifier tubes 1A1V1 and 1A1V2 socket assembly proceed as follows:

a. If tube pockets require repair, remove tubes 1A1V1 and 1A1V2 (paragraph 5-30).

TABLE 5-1 AM-3924(P)/URT TEST FREQUENCIES

BAND	LOW END OF BAND (MC)	CENTER FREQ. (MC)	HIGH END OF BAND (MC)	DRIVER		FINAL	
				COIL FORM	FIG. 5-1 WAVEFORM	COIL FORM	FIG. 5-1 WAVEFORM
1	2.00	2.25	2.50	A1	b	A1, $A2_1$	c
2	2.50	2.75	3.00	A2	b	A1, $A2_1$	e
3	3.00	3.25	3.50	$A3_2$	b	A3, $A4_1$	c
4	3.50	3.75	4.00	$A3_2$	b	A3, $A4_1$	b
5	4.00	4.50	5.00	$A4_2$	b	A5	a
6	5.00	5.50	6.00	$A4_2$	b	A6	a
7	6.00	6.50	7.00	$A5_2$	b	A7	d
8	7.00	7.50	8.00	$A5_2$	b	A8	d
9	8.00	9.00	10.00	$A6_3$	a	A9	a
10	10.00	11.00	12.00	$A7_3$	a	A10	a
11	12.00	13.00	14.00	$A8_3$	a	A11	d
12	14.00	15.00	16.00	$A9_3$	a	A12	d
13	16.00	17.00	18.00	$A10_3$	a	A13	a
14	18.00	19.00	20.00	$A11_3$	a	A14	a
15	20.00	21.00	22.00	$A12_3$	a	A15	d
16	22.00	23.00	24.00	$A13_3$	a	A16	b
17	24.00	25.00	26.00	$A14_3$	a	A17	b
18	26.00	27.00	28.00	$A15_3$	a	A18	b
19	28.00	29.00	30.00	$A16_3$	a	A19	b

Note 1. Primary on A1 (or A3), secondary on A2 (or A4). Each coil is used for two bands, with taps for higher frequency band (figure 5-24).

Note 2. Two coils, one for each band, on same coil form. Coil for lower frequency band is at end of coil form nearest opening where alignment tool is inserted.

Note 3. Two coils on same coil form connected as an overcoupled double tuned circuit for each band. Adjust both for alignment.

WARNING

Lethal RF and DC voltages exist on the connections and tube terminations. Determine that the equipment is fully de-energized and secured at the primary power source. Then short all exposed terminals to ground. Refer to NAVSHIPS 900,000 Electronics Installation and Maintenance, high-voltage adjustment procedures before continuing.

b. Remove driver tube assembly 1A1A1 (steps c through f of paragraph 5-30).

c. Remove driver transformer assembly 1A1A4.

d. Remove nine screws securing bottom plate to chassis.

e. Swing bottom plate out of way (wires need not be unsoldered).

f. If required, remove capacitor 1A1C59.

5-26. PRINTED CIRCUIT BOARD PARTS REPLACEMENT TECHNIQUES.

CAUTION

When removing the DC Power Control Assembly or the APC-PPC Assembly, lift up on both board retaining levers simultaneously, to prevent tilting of the board which could damage the board or socket connections.

5-27. To remove either printed circuit board, grasp the two levers and simultaneously swing them upward and out. The action will automatically release the board, and extract it from its socket.

5-28. When repairing the printed circuit boards, the procedures below should be carefully followed to avoid damage.

a. Use a pencil-type soldering iron with 25-watt maximum capacity. If only AC-operated irons are available, use an isolating transformer. Do not use a soldering gun; damaging voltages can be induced into the components and the very high temperature reached in a few seconds can damage components or the circuit board.

b. When soldering transistors or diodes, solder quickly; where wiring permits, use a heat sink (such as long nosed pliers) between the soldered joint and the body of the part being replaced.

c. Excessive heat or pressure can lift the copper strip from the board. Copper that lifts off from the board should be cemented in place with a quick drying acetate base cement having good electrical insulating properties.

d. Use only high quality rosin core solder when repairing printed circuit boards. NEVER USE ACID CORE SOLDER OR PASTE FLUX.

e. A break in the copper of a printed circuit board should be repaired by soldering a short length of tinned copper wire across the break.

f. When removing parts from the printed circuit board, apply heat sparingly to the lead of the part to be replaced. Remove part from the printed circuit board as the iron heats the lead. Use an awl to carefully clean the inside of the holes left by the old part.

g. When the part is replaced, tin the leads on the new part. Bend the clean tinned leads on the new part and carefully insert them through the holes in the printed circuit board. Bend the leads close to the foil and cut so that approximately one-sixteenth of an inch of lead length is left. Hold part against the board and quickly solder the leads.

5-29. POWER AMPLIFIER TUBES 1A1V1 AND 1A1V2 REPLACEMENT.

5-30. To remove either of the final power amplifier tubes 1A1V1 or 1A1V2 from the AM-3924(P)/URT, proceed as follows:

a. Set PRIMARY POWER switch at OFF.

b. Loosen eight captive screws on front panel and slide chassis out from case until chassis slides lock.

c. Remove and set aside ten machine screws which secure safety cover over tubes 1A1V1 and 1A1V2 on top rear of chassis (figure 5-7).

d. Remove cover.

WARNING

Lethal RF and DC voltages exist on the connections and tube terminations. Determine that the equipment is fully de-energized and secured at the source. Then carefully short all exposed terminals to ground. Refer to NAVSHIPS 900,000 Electronics Installation and Maintenance, high-voltage adjustment procedures before continuing.

e. Use a screwdriver with a well insulated handle or a shorting stick to short metal tops of tubes 1A1V1 and 1A1V2 to ground.

f. Carefully release tube clamp snap. Lift tube clamp off tube.

g. Without lifting, carefully rotate tube counter clockwise approximately sixty degrees until tube is free in socket. (Further rotation will be prevented by a hidden pin on bottom of socket).

CAUTION

When lifting the tube out of the socket, proceed slowly. If the tube catches, rock the tube gently to free it. Excessive force can damage tube and socket contacts.

h. Lift tube straight up from socket and set it aside.

5-31. To install a final power amplifier tube 1A1V1 or 1A1V2 proceed as follows:

Note

Before replacing tube 1A1V1 or 1A1V2, carefully inspect tube contacts on the tube and in the tube socket for signs of damage, or for signs of arcing which could indicate loose or improperly meshing contacts.

a. Observe guide pin in hole in base of tube, and orient tube so that guide pin mates with one of slots in center guide post in tube socket.

b. Gently lower tube over guide post and into socket until tube touches bottom.

c. Carefully rotate tube clockwise. Tube should rotate approximately sixty degrees, with moderate mechanical resistance as contacts mesh, until a hidden pin prevents further rotation.

d. Push tube clamp down over tube end.

e. Lock tube clamp snap.

f. Replace safety cover over tubes 1A1V1 and 1A1V2, securing it with ten machine screws which were previously removed.

g. Move plugs 1A1P6 and 1A1P7 (screen voltage connectors for tubes 1A1V1 and 1A1V2), to jacks 1A1J8 and 1A1J9 (figure 5-6).

h. If both tubes (1A1V1 and 1A1V2) are being replaced after 1000 hours of operation (as indicated by elapsed time meter), reset elapsed time meter (figure 5-7) to 0 with a small screwdriver inserted through access hole in top of meter. If only one malfunctioning tube is replaced, record elapsed time meter indication for future computations of hours of operation for new tube.

i. Refer to paragraph 5-7 and perform the complete screen voltage adjustment for tubes 1A1V1 and 1A1V2.

5-32. DRIVER AMPLIFIER TUBES 1A1A1V1 AND 1A1A1V2 REPLACEMENT.

5-33. To remove either of the AM-3924(P)/URT driver amplifier tubes 1A1A1V1 or 1A1A1V2 proceed as follows:

a. Set PRIMARY POWER switch at OFF.

b. Loosen eight captive screws on front panel and slide AM-3924(P)/URT chassis out from case until chassis slides lock.

c. Release chassis slide tilt locks and swing chassis up to vertical position.

WARNING

Lethal RF and DC voltages exist on the connections and tube terminations. Determine that the equipment is fully de-energized and secured at the primary power source. Then carefully short all exposed terminals to chassis ground. Refer to NAVSHIPS 900,000 Electronics Installation and Maintenance, high-voltage adjustment procedures before continuing.

d. Remove shield from over terminal board 1A1A1TB1 on bottom of driver tube assembly (figure 5-8).

e. Remove wires from terminal board 1A1A1TB1. (Tag each wire before removing to assure correct replacement).

CAUTION

When removing the Driver Tube Assembly, do not damage the spring contacts located between driver tube assembly 1A1A1 and driver transformer assembly 1A1A4.

f. Loosen two captive screws and carefully lift Driver Tube Assembly out from chassis.

g. Release tube clamp snap on tube to be removed.

h. Place a blunt tool against base of tube through underside of socket and push tube out. (These tubes fit very tightly in their sockets; be prepared to catch tube when it suddenly pops out).

5-34. To install a driver amplifier tube 1A1A1V1 or 1A1A1V2, proceed as follows:

a. Orient tube to properly align pins, and plug it into socket.

b. Engage and lock tube clamp snap.

CAUTION

While installing the Driver Tube Assembly observe that the spring contacts located between driver tube assembly 1A1A1 and driver transformer assembly 1A1A4 mate properly.

c. Carefully guide Driver tube Assembly into position on bottom of the main chassis and secure by tightning two captive screws. Ensure that edges of Driver Tube Assembly mate properly with their slots in main chassis.

d. Reconnect wires removed from 1A1A1TB1 to terminals noted in step e, of paragraph 5-34.

e. Replace shield over terminal board 1A1A1TB1.

f. Perform driver tube bias adjustment (paragraph 5-5).

5-35. CHAIN DRIVE REPLACEMENT.

5-36. To replace a broken or damaged chain in the AM-3924(P)/URT FREQUENCY MC drive mechanism proceed as follows:

a. Set PRIMARY POWER switch at OFF.

WARNING

Lethal RF and DC voltages exist on the connections and tube terminations. Determine that the equipment is fully de-energized and secured at the primary power source. Then carefully short all exposed terminals to chassis ground. Refer to NAVSHIPS 900,000 Electronics Installation and Maintenance, high-voltage adjustment procedures before continuing.

Note

If PP-3917/UR is used, it must be removed before performing the procedure below.

b. Loosen eight captive screws on front panel and slide AM-3924(P)/URT chassis out from case until chassis slides lock.

c. Release chassis slide tilt locks and tilt chassis up to expose underside.

d. Loosen (but do not remove) two phillips head screws which secure chain drive bracket to chassis (figure 5-8).

e. Release chassis slide tilt locks and tilt chassis back to horizontal position.

f. On each side of chassis, locate three machine screws which secure front panel. Remove top two and loosen bottom machine screw on each side. In addition, remove one screw in center of panel so that front panel will tip forward slightly.

g. Remove damaged chain.

h. Loosen two Allen set screws on FREQUENCY MC dial sprocket located directly behind front panel (figure 5-7) so that sprocket rotates freely on shaft.

CAUTION

When tilting the chassis up or down during chain installation, move the chassis slowly and carefully to prevent damage to the loosely secured front panel.

i. Thread new chain around motor drive sprocket on motor 1A1B2 (figure 5-8), over sprockets on chain drive bracket, and around chain sprocket on FREQUENCY MC dial. Arrange chain so that ends meet for connection just behind chain drive bracket, underneath chassis.

CAUTION

Excessive pressure when connecting the chain ends will crush the chain.

j. Connect two ends of chain by inserting connecting link into split sphere and gently closing sphere around line with a small pair of pliers.

k. Tip front panel back in position and secure by replacing machine screws removed in step f. Tighten all seven panel-mounting screws.

CAUTION

Excessive tension on the chain drive will cause excessive wear.

l. Ensure that chain drive is properly engaged in all sprockets, then use a screwdriver to push chain drive bracket toward front panel to take up slack in chain. Apply light tension to hold bracket in place while tightening two Phillips head screws which secure bracket.

m. Check chain tension. Chain should have just enough tension to eliminate slack.

n. Release chassis slide tilt locks and tip chassis down to horizontal position.

o. Manually rotate dial behind FREQUENCY MC window (figure 5-7), until one set screw is accessible.

p. Defeat two interlock switches on AM-3924(P)/URT case by pulling switch plungers straight out (figure 5-17).

Note

Reinstall pp-3917/UR if it was removed at the beginning of the procedure.

q. Set AM-3924(P)/URT PRIMARY POWER switch at ON and energize primary power source.

r. Set T-827/URT Mode Selector switch at STD BY.

WARNING

Lethal voltages as high as 2250 VDC and 440 VAC are present within the AM-3924(P)/URT chassis when it is energized. De-energize all equipment before making any adjustments.

s. Set AM-3924(P)/URT FREQUENCY MC switch to frequency band indicated in center of FREQUENCY MC window. AM-3924(P)/URT will automatically tune.

t. Set AM-3924(P)/URT PRIMARY POWER switch at OFF.

u. Carefully rotate dial behind FREQUENCY MC window, until numbers corresponding to setting of FREQUENCY MC switch are located in center of window.

v. Tighten set screw which is accessible on dial behind FREQUENCY MC window.

w. Set AM-3924(P)/URT PRIMARY POWER switch at ON.

x. Set AM-3924(P)/URT FREQUENCY MC switch at each position except AUTOMATIC. For each position, observe that numbers corresponding to switch setting are centered in window. Note amount of adjustment in dial setting required to center them perfectly.

y. Reset AM-3924(P)/URT FREQUENCY MC switch to position which makes dial set screw accessible.

z. Set AM-3924(P)/URT PRIMARY POWER switch at OFF.

aa. Loosen dial set screw and make necessary compensating adjustments in dial position.

ab. Tighten set screw.

ac. Repeat steps w through ab until dial position is satisfactory.

ad. Set AM-3924(P)/URT PRIMARY POWER switch at ON.

ae. Observe set screws on rear of dial and set FREQUENCY MC switch to different positions until second set screw is accessible for tightening.

af. Set T-827/URT Mode Selector switch at OFF.

ag. Set AM-3924(P)/URT PRIMARY POWER switch at OFF.

ah. Tighten second set screw on dial behind FREQUENCY MC window.

ai. Reset AM-3924(P)/URT FREQUENCY MC switch at AUTOMATIC.

aj. Release chassis slide locks and push the AM-3924(P)/URT chassis into case, securing it with eight captive screws on front panel.

5-37. TRANSMISSION ASSEMBLY MOTOR REPLACEMENT

CAUTION

The AM-3924(P)/URT final and driver transformer assemblies will not properly tune if the two couplings on the transmission assembly are not properly indexed after motor replacement.

5-38. Two small indexing blocks, constructed according to paragraph 5-46, will be required to properly index the couplings on the unit during reassembly. To replace the AM-3924(P)/URT transmission assembly drive motor, proceed as follows:

Note

If PP-391 7/UR is used, it must first be removed before performing the procedure below.

a. Remove final tubes 1A1V1 and 1A1V2 (paragraph 5-30).

b. Disconnect 1A1A2P1 from VSWR bridge assembly 1A1A3.

c. Disconnect lead to final tubes 1A1V1 and 1A1V2 from contact block on final transformer assembly.

d. Loosen four captive screws and remove final transformer assembly.

e. Remove chain (steps c through g of paragraph 5-36).

f. Unsolder two leads for band switching motor at standoff terminals on side of chassis plenum.

g. Remove transmission assembly from main chassis by removing four screws which secure assembly through chassis (two beneath final transformer assembly and one inside each final tube cooling chimney).

CAUTION

Mechanical support must be provided when installing or driving out pins to prevent damage to the ball bearings.

h. Remove retaining ring that secures coupling to motor shaft. Remove coupling.

i. Remove pin from motor shaft.

j. Remove retaining ring securing bearing on motor shaft.

k. Remove pin securing large gear to motor shaft.

l. Remove pin securing sprocket to motor shaft.

m. Remove screws securing transmission assembly cover; remove cover.

n. Remove three hex screws securing motor to transmission assembly; remove and discard defective motor.

o. Position new motor by pushing motor shaft through hubs of sprocket and gear, and then through transmission assembly housing. Align motor and secure with three hex screws removed in step n.

p. Push bearing down on motor shaft and snap into hole in housing.

q. Install bearing retaining ring on motor shaft.

r. Install two spring and one flat washer on motor shaft.

s. Drill a 0.063 hole in motor shaft and replace coupling drive pin removed in step i.

t. Slip coupling over drive pin and secure with coupling retaining ring removed in step h.

u. Attach two indexing blocks (constructed according to paragraph 5-46) to two couplings on transmission assembly. Use clamps to hold indexing blocks in position while drilling.

v. With gears engaged, hold transmission assembly with motor on bottom, and apply pressure to rotate large gear on motor shaft counterclockwise to absorb backlash (indexing blocks will prevent gear from turning).

w. Maintain counterclockwise pressure on gear and carefully drill a 0.063 hole through gear hub and shaft.

x. Use pin removed in step k to pin gear and shaft.

y. Hold sprocket firmly away from motor and frame wall to provide clearance. Drill a 0.063 hole through sprocket hub and shaft.

z. Use pin removed in step 1 to pin sprocket to shaft.

aa. Remove indexing blocks.

ab. Replace transmission cover removed in step m.

ac. Install transmission assembly by positioning assembly under chassis and replacing four screws removed in step g.

ad. Solder two motor leads removed in step f to standoff terminals on side of chassis plenum.

ae. Replace chain (steps h through ai of paragraph 5-36).

af. Replace final transformer assembly. (Do not secure).

Note

Reinstall the PP-3917/UR if it was removed at the beginning of the procedure.

ag. Replace two final tubes by performing steps a through e of paragraph 5-31.

CAUTION

To prevent damage to the transformer assemblies, do not key the system until proper switch indexing has been confirmed.

ah. Set AM-3924(P)/URT PRIMARY POWER switch at ON.

ai. Set T-827/URT Mode Selector switch at STD BY.

CAUTION

Lethal voltages as high as 2250 VDC and 440 VAC are present within the AM-3924(P)/URT chassis when it is energized. De-energize all equipment before making adjustments.

aj. Set AM-3924(P)/URT FREQUENCY MC switch to any random position and observe that bandswitching motor tunes, as indicated by movement of dial behind FREQUENCY MC window.

ak. Reset FREQUENCY MC switch at 2.0-2.5.

al. De-energize system.

am. Carefully remove driver transformer assembly and check that switch wiper contacts on decks A or B are at position 1.

an. Carefully remove final transformer assembly and check that switch wiper contacts are properly centered at position 1.

Note

If both driver and final transformer assembly switch center wipers are off center an equal amount in the same direction, the error may be corrected by removing the two plug buttons on the driver transformer assembly top plate, loosening the top switch deck, and rotating it slightly in a proper direction to correct the error.

ao. Replace two transformer assemblies and secure. Proceed with adjustment until switch contacts are properly aligned.

ap. Connect 1A1A2P1 to VSWR bridge and lead from final tubes to final transformer assembly contact block.

aq. Replace cover over final tubes and secure with ten screws.

ar. Release chassis slide locks, and push AM-3924(P)/URT chassis into case, securing it with eight captive screws on front panel.

5-39. FINAL TRANSFORMER ASSEMBLY 1A1A2 SWITCH REPLACEMENT

5-40. Final transformer assembly 1A1A2 is a complex assembly in which lead dress and coil position will critically affect alignment. Since the assembly is built around the switch, the assembly will have to be almost completely dismantled in order to replace the switch. If an individual coil assembly must be removed for replacement, perform steps a through f and if required, steps g through i. The switch for final transformer assembly 1A1A2 is shipped with the leads to the coils attached. Illustrated instructions for coil positioning, lead dress and connection are contained in figure 5-11. Leads must be positioned, cut to length and soldered with high temperature solder (type Ag1.5 or Ag2.5 per QQ-5-571). A small jig, manufactured according to the specifications of paragraph 5-46 will be required for relocating the coupling on the end of the switch shaft, when the final transformer assembly switch is replaced. The switch replacement will have to be followed by a careful check for proper continuity, and a complete alignment of the final transformer assembly. To replace the final transformer assembly switch, proceed as follows:

CAUTION

High RF and DC voltages are present within the final transformer assembly. To avoid damage from arcing or excessive current to the coils or the replaced switch, do not attempt to operate full power until the final transformer assembly has been fully checked out and aligned.

a. Loosen eight captive front panel screws and pull AM-3924(P)/URT chassis out from case until chassis slides lock.

b. Remove final transformer assembly as follows:

(1) Remove cover from over final tubes by removing ten screws.

(2) Disconnect connector 1A1A2P1 from VSWR bridge.

(3) Disconnect lead from final tubes at terminal on contact block.

(4) Loosen four captive screws and lift final transformer assembly out from chassis.

c. Remove and set aside flathead screw from top plate (near coil A14).

d. Remove and set aside six machine screws attaching ground plate. Carefully set aside ground plate and any shims which may be under it.

e. Remove and set aside six machine screws which secure top plate to final transformer assembly. Lift off top plate and set it aside.

f. Unsolder three connections to resistors on resistor bracket.

g. Unsolder five connections to capacitors mounted underneath top switch plate, and connection to input terminal from final tubes on top plate.

h. Remove and set aside two machine screws and nuts which secure resistor bracket assembly to bottom plate.

i. Remove and set aside four machine screws which secure top switch plate. Lift off top switch plate with resistor bracket attached.

CAUTION

Lead dress and coil orientation are critical. Study figure 5-11 and if necessary, make additional sketches to ensure that the position of each lead to any coil is fully understood before unsoldering. The coil must be oriented when replaced so that the lugs are in the same position as when removed.

j. Carefully unsolder and remove four coils (A2, A4, A5, A7 and A13, A15, A17, A19) from each end of assembly.

k. Disconnect all remaining switch connections to coils at their termination on coil.

l. Cut lacing securing coaxial lead from switch.

m. Remove four flat head machine screws securing switch bottom plate to final transformer assembly bottom plate, and carefully slide switch out of final transformer assembly.

n. Drive out pin through coupling and switch center shaft, and remove coupling from switch.

CAUTION

The switch for the final transformer assembly has no detent spring. The switch wiper must be carefully centered on the proper contacts by the position of the coupling.

o. Slide coupling on to shaft of new (replacement) switch.

p. Carefully center switch wiper contacts on position one as shown in figure 5-11.

q. Without disturbing positioning of switch shaft, slide indexing jig (fabricated according to paragraph 5-46 and figure 5-3) into position on bottom of switch, with jig guide pins through holes in switch bottom plate, and coupling tight against jig, with drive pin in index slot.

r. Carefully hold jig and switch wiper in positions described in p and q, and drill and pin coupling on switch shaft (use a no. 52 (.063 in.) drill).

s. Unsolder coaxial cable from removed switch and solder it to proper contacts on new (replacement) switch.

CAUTION

When bending switch leads to dress them, avoid sharp bends which may cause damage to the insulation.

t. Using figure 5-11 as a guide, carefully bend switch leads to clear coil forms. Slide switch into position on final transformer assembly, and secure, using four machine screws removed in step m.

u. Using figure 5-11 as a guide, carefully dress each switch lead and cut to length and solder, using high temperature solder (type Ag1.5 or Ag2.5 as specified in QQ-5-571). Ensure that leads are routed properly between coils, and that distances above bottom plate noted at reference points are carefully observed. Make connections to coils still mounted on assembly first, then replace removed coils, one by one, soldering the leads to each one in turn. Ensure that replaced coils are properly oriented, with lugs pointing in right direction, before soldering. Ensure that all other connections, to capacitors and to other coils, are also made as each coil is replaced.

Note

When it is not damaged, it is more expedient to use the old top switch plate, rather than transfer all of the capacitors to the new switch plate.

v. Remove top switch plate from new switch.

w. Carefully position top switch plate and resistor bracket from old switch, and secure, using machine screws removed in steps h and i.

x. Dress and secure coaxial lead.

y. Using figure 5-11 as a guide, solder connections to capacitors and output terminal on top switch plate, and resistors on resistor bracket. (Normal rosin-core solder may be used in this step.)

z. Set final transformer assembly top plate in position and secure coaxial lead clamp by replacing machine screw removed in step c.

aa. Secure final transformer assembly top plate by replacing machine screws removed in step e.

ab. Set ground plate in position over final transformer assembly top plate and switch top plate. Note where shims are required, and shim as necessary, securing ground plate with screw removed in step d.

ac. Connect AN/PSM-4 multimeter between center lead of coaxial cable and input terminal on final transformer assembly top plate. Check for continuity with final transformer assembly switch in positions one through nineteen (20 through 24 are not used).

ad. Reconnect AN/PSM-4 between center lead of coaxial cable and top of capacitor C10 (figure 5-11), and check continuity for switch positions one through nineteen.

ae. Reconnect AN/PSM-4 between center lead of coaxial cable and top (or bottom) plate of final transformer assembly, and check switch positions one through nineteen again. Switch positions one through four should check approximately 7,000 ohms, switch positions five through 19 should check open (infinity).

af. Give repaired assembly a thorough visual inspection, then replace it in AM-3924(P)/URT chassis. It is not necessary to attach input lead to assembly or to connect coaxial cable at this time.

CAUTION

To avoid damage to the repaired final transformer assembly, do not attempt to key the AM-3924(P)/URT until the assembly has been carefully aligned.

ag. Defeat two interlock switches on AM-3924(P)/URT case by pulling switch plungers straight out (figure 5-17).

ah. Set AM-3924(P)/URT PRIMARY POWER switch at ON.

ai. Set T-827/URT Mode Selector switch at STD BY. Do NOT go beyond STD BY.

WARNING

Lethal voltages as high as 2250 VDC and 440 VAC are present within the AM-3924(P)/URT chassis when it is energized. De-energize all equipment before making adjustments.

aj. Set AM-3924(P)/URT FREQUENCY MC switch to any random position, then reset to 2.0-2.5.

ak. Set AM-3924(P)/URT PRIMARY POWER switch at OFF.

al. Carefully remove final transformer assembly from AM-3924(P)/URT and check that assembly switch wiper contact is properly centered on contact terminal one. If not perform steps ad and ae of paragraph 5-42.

am. Replace final transformer assembly in AM-3924(P)/URT.

an. Reconnect connector 1A1A2P1 to VSWR bridge and lead from final tubes to contact block on transformer assembly.

ao. Replace cover over final tubes and secure with ten screws.

Note

If proper alignment of any one channel is not possible, check the following:
1. Check that switch wiper contact is set at right channel.
2. Refer to figures 5-11 and 5-24 and ensure that proper capacitors and leads are connected to the correct lugs on the coil.

3. Check lead dress of leads near and connected to the coil.

ap. Refer to paragraph 5-21 and carefully perform a complete alignment of the final transformer assembly, followed by a careful system check (paragraph 2-34).

5-41. DRIVER TRANSFORMER ASSEMBLY 1A1A4 SWITCH. REPLACEMENT

5-42. A small jig, manufactured according to the specifications of paragraph 5-41, will be required for relocating the coupling, when the driver transformer assembly switch is replaced. To replace the driver transformer assembly switch proceed as follows:

a. Loosen eight captive front panel screws and pull AM-3924(P)/URT chassis out from case until chassis slides lock.

b. Release chassis slide tilt locks, and tip chassis up to expose underside.

c. Remove drive transformer assembly.

d. Remove center plug button and insert a screwdriver through slot in top plate of transformer assembly, and index switch until pin through switch shaft and coupling are aligned with access hole in bottom plate.

e. Drive out pin and remove coupling from switch shaft.

f. Disconnect capacitor C2 from bottom of TP1 (figure 5-13).

g. Remove and set aside machine screw which secures contact mounting strip to top plate (figure 5-13).

h. Remove and set aside four screws which secure top plate. Tip plate to one side (if care is taken, wires to terminal board need not be removed).

i. Carefully sketch transformer and code wire connections to switch.

j. Unsolder transformer and code wire connections to switch.

k. When all connections to switch, with exception of short jumper wires between decks, have been removed, turn assembly over, and remove nut which secures switch shaft to bottom plate. Carefully lift switch out from between transformer subassemblies.

Note

Driver transformer assembly 1A1A4 schematic (figure 5-25) will assist in rewiring the assembly.

l. Using removed switch as a guide, solder all jumper wires to new replacement switch using no. 22 tinned copper buss wire.

m. Orient switch so terminal one is on side toward driver amplifier, and insert switch into driver transformer assembly. Secure switch by replacing nut on switch shaft, removed in step k.

n. Using sketch made in step i, resolder all transformer subassembly and code wire connections to switch.

o. Replace top plate, using four machine screws removed in step h.

p. Reconnect capacitor C2 to the bottom of TP1.

q. Replace machine screw which secures contact mounting strip to top plate.

r. Slide coupling on to switch shaft.

s. Obtain a small jig, manufactured according to paragraph 5-46 and figure 5-3 to properly index switch wiper contact to coupling drive pin.

t. Slide guide pins on indexing jig into holes for locating pins on bottom plate of driver transformer assembly. Rotate coupling under jig until drive pin on coupling is aligned with slot in jig, and press jig down over coupling.

CAUTION

The jig will position the coupling hub firmly against the hub of the switch mounting plate, excessive pressure on the jig during drilling may cause the coupling to bind.

Note

There is no detent spring on the switch. When positioning the switch wiper, ensure that the contact is properly centered.

u. Insert a screwdriver through access hole in top plate of driver transformer assembly, and rotate switch shaft until wiper contact on decks A and B is centered on position one. (Transformer subassembly A1 is connected to switch contacts 1.)

v. Without disturbing switch position, and while carefully holding indexing jig in place, drill and pin coupling to switch shaft. (Use a no. 50 (0.063 in) drill).

w. Remove indexing jig.

x. Replace driver transformer assembly in AM-3924(P)/URT chassis.

y. Defeat two interlock switches on AM-3924(P)/URT case by pulling switch plungers straight out (figure 5-17).

z. Set AM-3924(P)/URT PRIMARY POWER switch at ON.

aa. Set T-827/URT Mode Selector switch at STD BY.

WARNING

Lethal voltages as high as 2250 VDC and 440 VAC are present within the AM-3924(P)/URT chassis when it is energized. De-energize all equipment before making adjustments.

ab. Set AM-3924(P)/URT FREQUENCY MC switch to any channel at random. Then reset FREQUENCY MC switch at 2.0-2.5.

ac. Set AM-3924(P)/URT PRIMARY POWER switch at OFF.

ad. Remove final transformer assembly 1A1A2 and observe that the switch wiper contacts are centered on position 1. If the wiper contact is not properly centered on switch terminal 1, loosen top switch deck in driver transformer assembly (through plugged access holes) and rotate it slightly to correct the error.

ae. Replace final transformer assembly; and repeat steps aa through ad until alignment of final switch is correct. Then check at bands 6-7, 16-18, and 28-30 and readjust slightly if necessary for best alignment on all bands.

af. Perform driver transformer alignment procedure (paragraph 5-20) to complete replacement.

5-43. TEST FIXTURE FABRICATION.

5-44. PRINTED CIRCUIT BOARD EXTENDER FABRICATION.

5-45. To enable testing and troubleshooting of the AM-3924(P)/URT printed circuit boards, extenders will have to be fabricated. Two extenders are required; one for DC Power Control Assembly 1A1A5 and another for APC-PPC Assembly 1A1A6. To fabricate the extenders, proceed as follows:

a. Procure the following material:

(1) 2 Vero Electronics Inc. plug-in boards, Part Number 289.

(2) 1 Amphenol (FMC 02660) connector, Part Number 143-036-21-1015-101.

(3) 1 Amphenol (FMC 02660) connector, Part Number 143-036-21-1017-101.

(4) 4 right angle brackets approximately 1/2 inch on a side, 1/4 inch wide, and 1/16 inch thick (aluminum or equivalent material).

(5) Insulated AWG No. 22 wire as required.

(6) 2 Amphenol (FMC 02660) polarizing keys, Part Number 143-953.

b. Drill two angle brackets as required and attach the 143-036-21-1015-101 connector to the contact strip side of one board. Label this assembly the 1A1A5 extender.

c. Drill the other two angle brackets as required and attach the 143-036-21-1017-101 connector to the side opposite the contact strips on the other board. Label this assembly the 1A1A6 extender.

d. Wire each extender connector pin to the contact strips such that pin A of the extender connector will connect with pin A of the corresponding chassis connector, pin B to B, etc.

e. In the plug-in end of each board, saw a 0.08 to 0.1 inch wide by 0.5 inch long slot between the contact strips which correspond to connector pins N and P and another between the contact strips which correspond to pins b and c.

f. In the plug-in end of the 1A1A5 extender saw out the contact strip corresponding to pin S of the connector for a distance of 0.5 inch back from the mating end of the board.

g. In the plug-in end of the 1A1A6 extender, saw out the contact strip corresponding to pin X of the connector for a distance of 0.5 inch back from the mating end of the board.

h. Insert a polarizing key into pin S of the connector on the 1A1A5 extender, and one into pin X of the 1A1A6 connector. Carefully tack solder these keys in place (without touching adjacent contacts) to insure that the keys will remain in the proper positions.

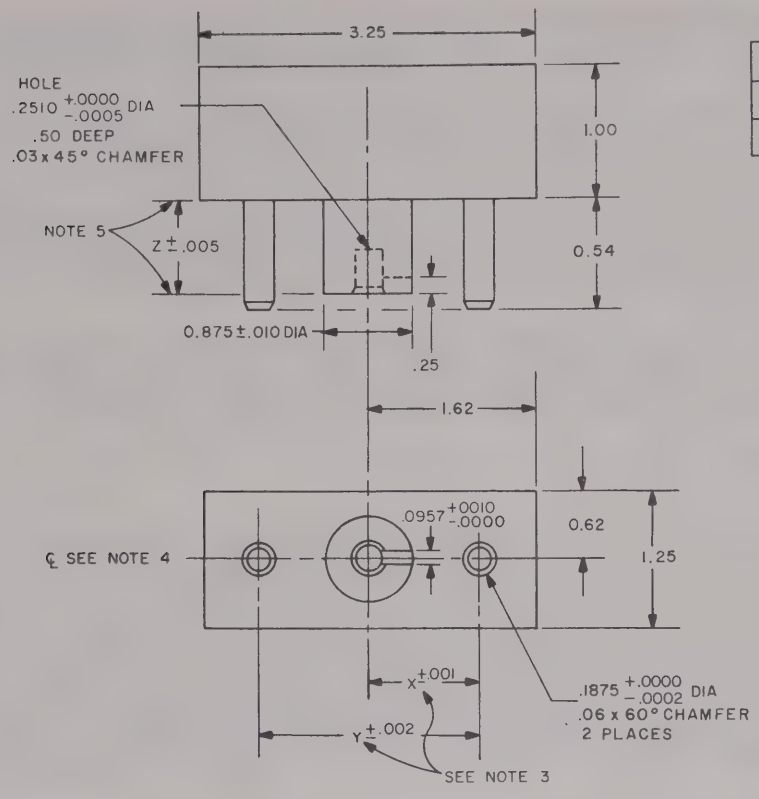
i. NOTE that when the 1A1A6 extender is used, the 1A1A6 APC-PPC Printed Circuit Assembly will have to be turned around so its components are facing toward the right hand side of the set. That is, when using the extender, the boards will mount back to back.

5-46. INDEXING JIG FABRICATION

5-47. In order to replace the components in the transmission assembly, or the switch in either of the transformer assemblies, small indexing jigs will be required. These small jigs orient the couplings on the switch (or gear) shaft so that the driver transformer assembly (1A1A4) switch will be indexed to the same channel by the bandswitching motor. Both switches have over 20 positions, therefore, even a small error in layout or construction of the jig can result in serious equipment malfunction. When constructing the jigs, carefully observe all dimension tolerances. Fabricate the jigs from tool steel, with guide pins press fitted in proper relationship to reference holes. Figures 5-3 and 5-4 list dimensions and construction details.

5-48. VOLTAGE AND RESISTANCE MEASUREMENTS.

5-49. Tables 5-2 through 5-5 provide voltage and resistance information for the tubes and transistors of the AM-3924(P)/URT, PP-3916/UR, and PP-3917/UR. All voltage measurements should be made with a 20,000 ohms/volt meter and should be within ±20% of the indicated value. Unless otherwise specified, the voltage measurements are all DC levels and were made with the Multimeter common lead connected to chassis ground. No voltage measurements are provided for the final amplifier tubes, due to the extreme hazards involved in measurement. This circuit can be safely checked with the front panel Multipurpose meter, the resistance information in table 5-4, and by making continuity measurements between the tube socket and metering circuit. All resistance measurements should be made with the tubes in their sockets and with the exception of screen and grid circuits, should be within ±20% of the indicated value. The screen and grid circuit resistance measurements may vary +300% and -70% due to the semiconductor circuits, depending on the meter in use and the temperature of the set.

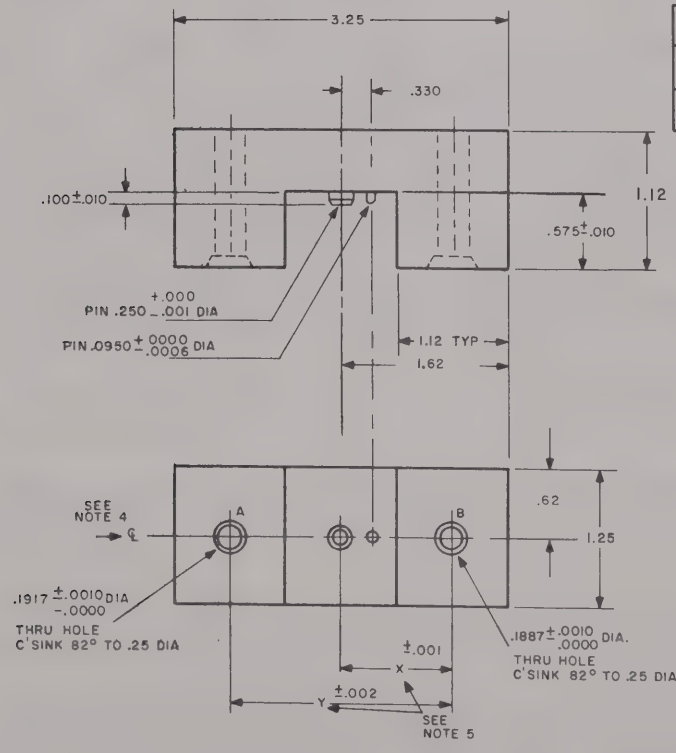


ASSY	X	Y	Z
1A1A4	.750	1.500	.578
1A1A2	1.125	2.250	.523

NOTES

1. MATL, TOOL STEEL
2. FINISH: NONE
3. MAKE TWO JIGS ONE FOR FINAL AND ONE FOR DRIVER TRANSFORMER ASSY. SEE TABLE ABOVE FOR X, Y, AND Z DIMENSIONS.
4. ℄ OF GUIDE PINS AND ℄ OF SLOT TO BE WITHIN .001.
5. THESE TWO SURFACES MUST BE PARALLEL +.010 IN.
6. TOLERANCE: .XXX = ± .005 .XX = ± .02

Figure 5-3. Fixtures to Locate Couplings on Transformer Assemblies



	X	Y
1A1A4 COUPLING	.750	1.500
1A1A2 COUPLING	1.125	2.250

NOTES

1. MATL: TOOL STEEL
2. FINISH: NONE
3. PRESS FIT PINS
4. ℄ OF PINS TO BE POSITIONED ON ℄ OF "A" AND "B" HOLES WITHIN .001
5. MAKE ONE FIXTURE FOR COUPLING MATING WITH 1A1A4 AND ONE FOR COUPLING MATING WITH 1A1A2. SEE TABLE ABOVE FOR X AND Y DIMENSIONS
6. TOLERANCES: .XXX = ± .005 .XX = ± .02

Figure 5-4. Fixtures to Locate Couplings on Transmission Assembly

TABLE 5-2. DRIVER AMPLIFIER ASSEMBLY 1A1A1 VOLTAGE MEASUREMENTS

Note

The voltage measurements for the driver amplifier are made at the terminals of terminal board 1A1A1TB1. If the driver amplifier assembly were removed to gain access directly to the tube sockets, cooling air to both the driver and final amplifier tubes would be lost.

1A1A1TB1 TERMINAL No. / COND	1	2	6	7	8	9	10	11	12	13
OPERATE	530	287	13.5 VAC	0	-83	0	0	0.85	0	0
KEYED, NO SIGNAL	510	287	13.5 VAC	0	-2.7	3.4*	3.4*	0	0	0
KEYED, 1KW AVG (CW MODE)			13.5 VAC	0		3.4*	3.4*		0	0

*Multipurpose meter switch must not be set in DRIVER 1 AMPERES or DRIVER 2 AMPERES position during this measurement.

Note

Resistance measurements made directly at the tube sockets, with the assembly wired into the set. To remove the 1A1A1 assembly without disconnecting the leads to 1A1A1TB1, first detach the small cable clamps holding the main cable against the rear lip of the chassis near 1A1A4.

TABLE 5-3. DRIVER AMPLIFIER TUBES 1A1A1V1/V2 RESISTANCE MEASUREMENTS

TUBE SOCKET PIN NO. / COND	1	2	3	4	5	6	7	8	9	10	11
METER POSITIVE POLARITY	10.0	220K	23K	10.0	0	0.2	220K	23K	10.0	220K	23K
METER NEGATIVE POLARITY	10.0	40K	22K	10.0	0	0.2	40K	22K	10.0	40K	22K

ORIGINAL

Note

See paragraph 5-25 to obtain access to final tube sockets. These measurements are made with 1A1A1 and 1A1A4 disconnected and removed from the set. Figure 5-5 illustrates the final tube socket.

TABLE 5-4. FINAL AMPLIFIER TUBES (1A1V1/V2) RESISTANCE MEASUREMENTS

PIN / COND	FILAMENTS	GRID	SCREEN	PLATE	CATHODE
METER POSITIVE POLARITY	5.4	5.5K	175K	800K	5
METER NEGATIVE POLARITY	5.4	16K	70K	125K	5

TABLE 5-5. TRANSISTOR DC VOLTAGE MEASUREMENTS

Note

Numbers in parenthesis in E, B, and C columns refer to number of applicable note at end of table.

TRANSISTOR STAGE	CONDITION (NOTE 1)	DC VOLTAGE TO GROUND		
		E	B	C
Amplifier, Radio Frequency AM-3924(P)/URT (Prefix reference designations with 1A1.)				
Q1	Positive ground (Note 7) Negative ground (Note 7)	-11.8 0	-12.1 0	-21 -8.7
A5Q2	Normal Overload	20.5 20.0	20.5 19.0	0.15 20.0
A5Q3	Normal (Unkeyed) Overload	4.6 9.2	0.3 9.9	20.5 9.3
A5Q4	Normal Coupler interlock grounded or band-switch motor running	11.5 11.0	11.5 11.0	0.1 11.0

TABLE 5-5. TRANSISTOR DC VOLTAGE MEASUREMENTS (Cont)

TRANSISTOR STAGE	CONDITION (NOTE 1)	DC VOLTAGE TO GROUND		
		E	B	C
A5Q5	Normal-Keyed Normal-Unkeyed Coupler Interlock grounded or band-switch motor running	5.8 8.4 8.4	5.5 10.5 11.0	4.5 -0.1 -0.1
A5Q6	Normal Keyed	-0.1 0.28	0 0	-68.0 0.35
A5Q7	P.S. Interlock Closed P.S. Interlock Open	0.5 17.5	1.1 18.0	0.5 28.5
A5Q8	Normal Coupler Interlock	26.0 0.07	26.5 0.22	27.0 27.0
A5Q9	Normal Coupler Interlock	26.5 0.22	27.0 0.65	27.0 27.0
A5Q10	Standby	11.0	11.5	18.0
A5Q11	Standby	11.5	12.0	20.0
A5Q12	Positive Ground (Note 7) Negative Ground (Note 7)	-12.1 -0.3	-12.4 -0.6	-21.0 -9.2
A6Q1	Keyed -1KW AVG Output (Notes 2, 3)	2.6	3.0	10.8
A6Q2	Normal-Unkeyed Normal-Keyed	-90.0 .17	-90.0 .77	-68.0 .23
A6Q3	Normal-Unkeyed Normal-Keyed	9.0 7.0	10.5 6.8	-90.0 6.9
A6Q7	Keyed -1KW AVG Output (Note 3) Tune Keyed - 200W	0 2.0	-0.17 11.5	0 0
A6Q8	Keyed -1KW AVG Output (Note 3)	1.65	2.1	10.5(5)
A6Q9	Standby Keyed-1KW AVG Output (Note 3)	11.0 10.9	10.7 10.5	0 0.3(8)
A6Q10	Standby Keyed-1KW AVG Output (Note 3)	0.25 (8)1.75	0 (8)0.3	11.0 10.8
A6Q11	Standby Keyed-1KW AVG Output (Note 3)	(6)1.65 (6)1.65	(6)2.15 (6)2.15	(6)3.6 (6)3.9
A6Q12	Standby Keyed-250W Output (Note 4)	-0.5 0.5	0 1.05	20.0 (5)17.0

TABLE 5-5. TRANSISTOR DC VOLTAGE MEASUREMENTS (Cont)

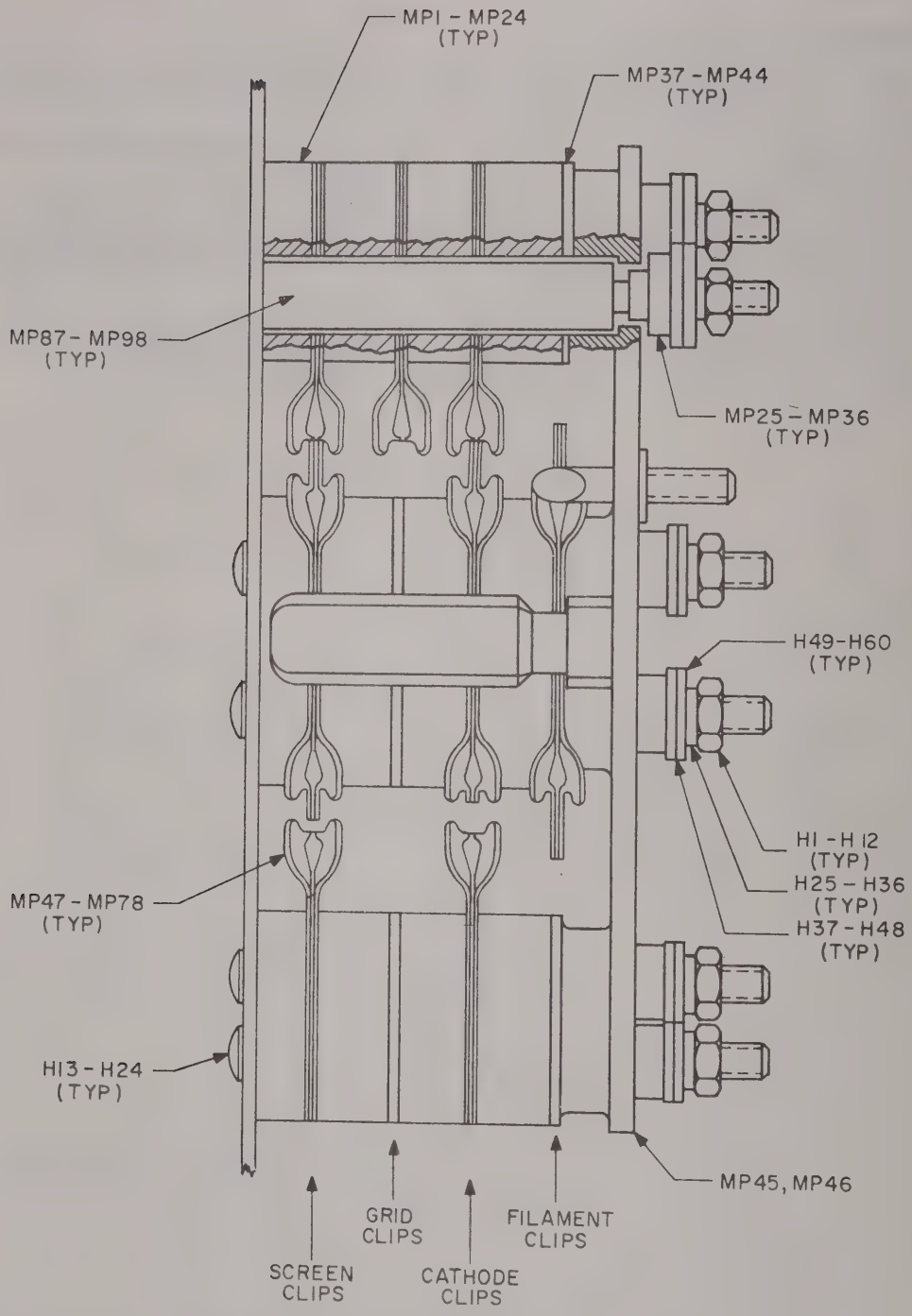
TRANSISTOR STAGE	CONDITION (NOTE 1)	DC VOLTAGE TO GROUND		
		E	B	C
A6Q13	Standby Keyed-250W Output (Note 4)	20.2 (5)17.2	19.7 (5)16.7	0.35 (5)5.1
A6Q14	Standby Keyed-250W Output (Note 4)	0 (5)4.6	0.35 (5)5.1	20.4 19.2
A6Q15	Standby Keyed-250W Output (Note 4) Keyed-1KW AVG Output (Note 3)	0 (5)4.0 4.2	0 (5)4.5 0	11.0 11.0 11.2
A6Q16	Standby Keyed-1KW Output (Note 3)	0 1.8	0.4 2.1	11.0 11.0
A6Q17	Standby Tune Keyed	43.8 38.9	44.0 38.5	0 38.9
A6Q19	Standby Keyed (Note 3)	11.3 10.3	11.8 10.2	-100.0 10.2
A6Q20	Standby Normal - Keyed Keyed (Note 3)	-102.0 -33.6 -33.6	-102.0 -34.0 -24.5	-102.0 -34.0 -67.0
A6Q21	Standby Normal - Keyed Keyed(Note 3)	-109.0 -48.5(9) -67.0	-108.0 -47.5(9) -67.0	-102.0 -34.0 -34.0
Power Supply PP-3916/UR (Prefix reference designations with 2A1.)				
Q1		21.0	21.0	0
Q2		21.0	21.0	0
Power Supply PP-3917/UR (Prefix reference designations with 1A1A8A1.)				
Q1		41.0	42.5	0
Q2		41.0	42.5	0

NOTES:

1. Measurements taken in LSB mode, unkeyed, unless otherwise specified; no modulation.
2. Readings may vary ± 1 volt or more depending on input power level.
3. CW mode.

TABLE 5-5. TRANSISTOR DC VOLTAGE MEASUREMENTS (Cont)

4. AM mode; no modulation.
5. This reading may vary ± 2 volts from set to set, and may change when a different T-827/URT is used.
6. This reading made on 10 V scale or higher to avoid loading due to meter resistance.
7. These conditions refer to whether the positive or negative side of the floating 12 V Remote supply is grounded in the system being measured. T-827/URT is in Remote, with a C-1138/UR Radio Set Control connected and keyed in LSB, no signal.
8. The waveform at this point consists of a random series of short pulses; hence the reading on a DC voltmeter serves only as a guide.
9. Exact value depends on setting of PA BIAS control 1A1R10.



NOTE:
AS SHOWN ABOVE, THE VIEW IS FROM THE REAR, AS IF LOOKING THRU THE REAR WALL OF THE CHASSIS.
XV1 IS SHOWN, XV2 IS IDENTICAL, EXCEPT IT IS A MIRROR IMAGE

Figure 5-5. Final Tube Socket Details

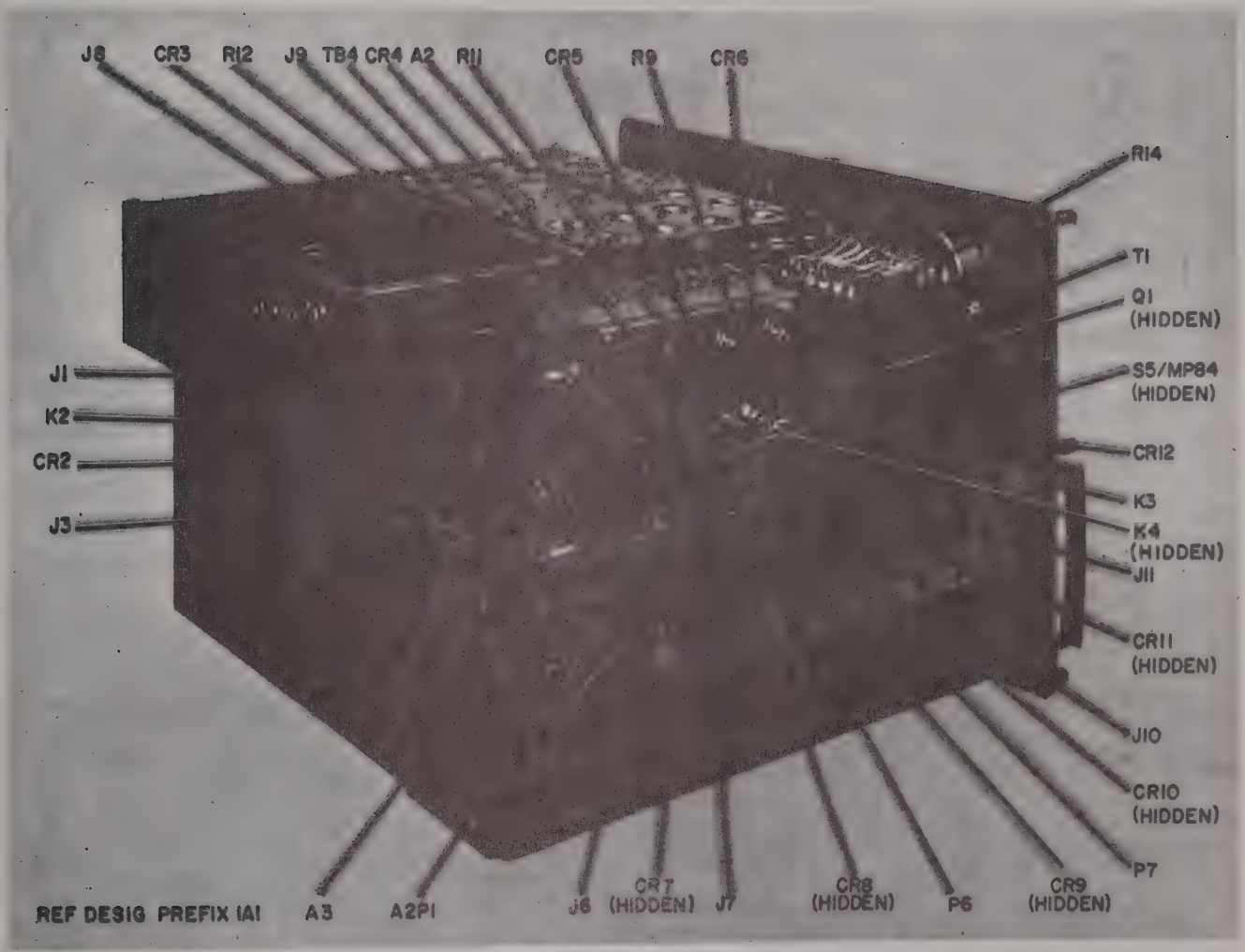


Figure 5-6. Radio Frequency Amplifier AM-3924(P)/URT, Rear View, Component Locations

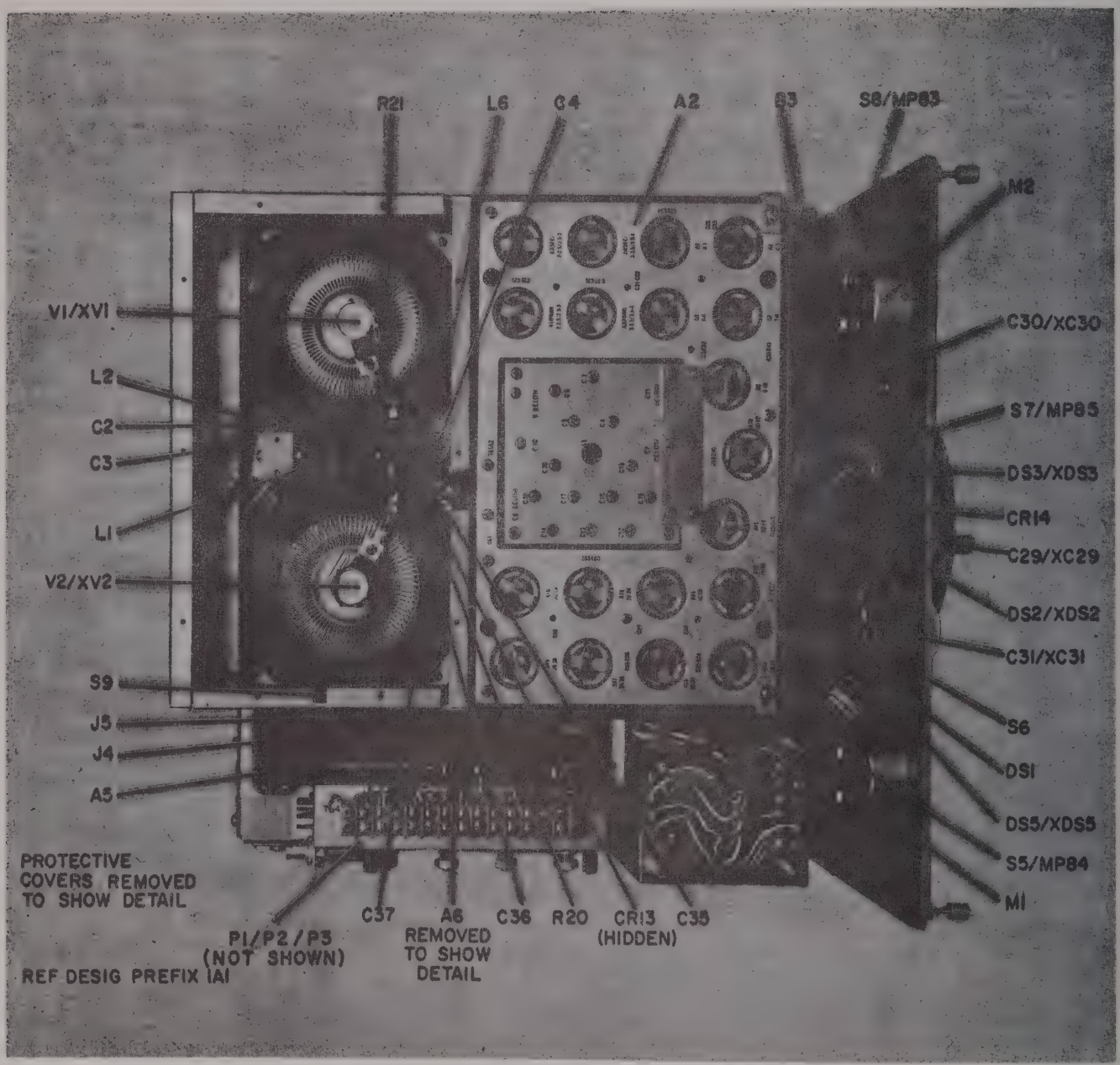


Figure 5-7. Radio Frequency Amplifier AM-3924(P)/URT, Top View, Component Locations

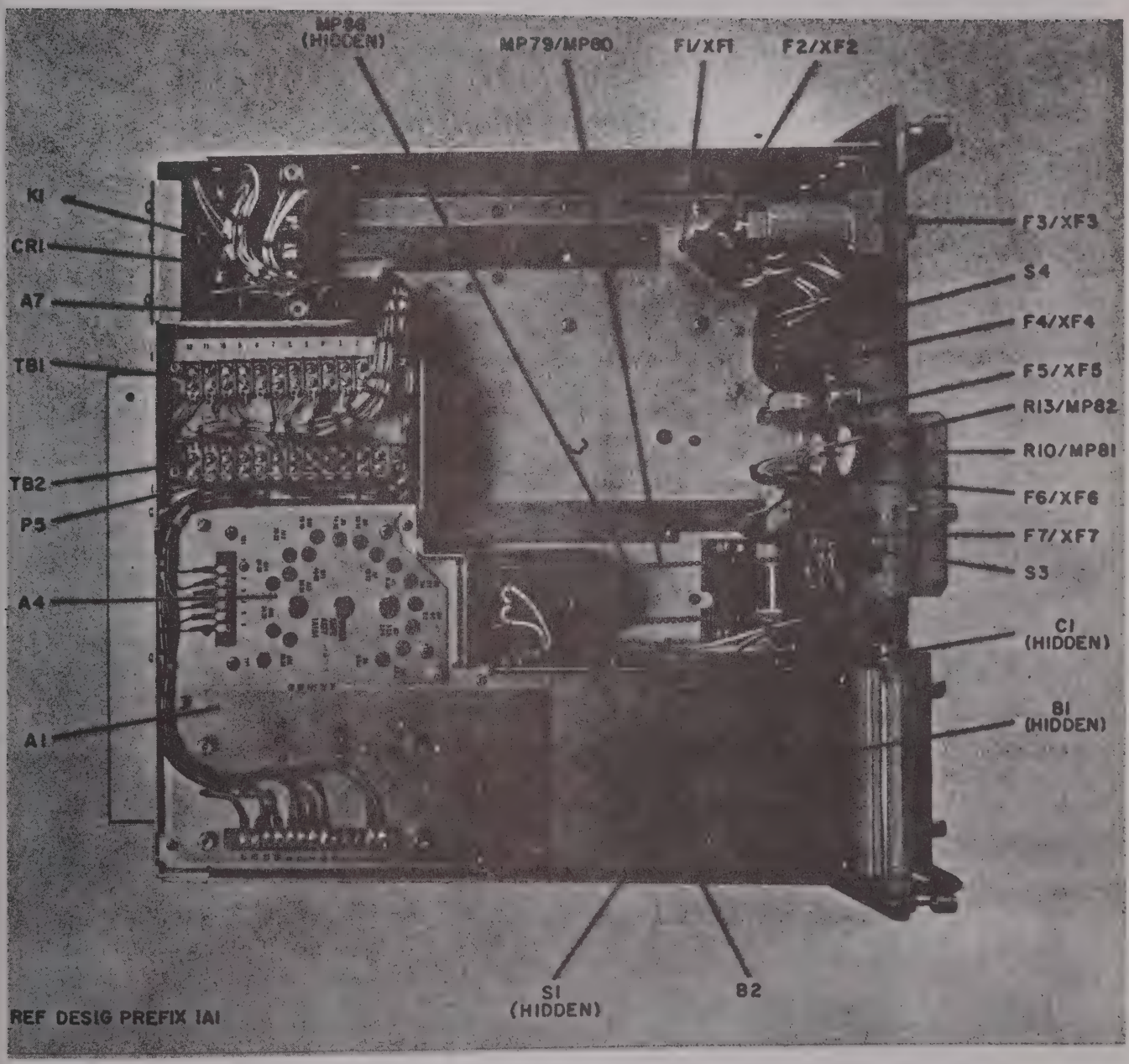


Figure 5-8. Radio Frequency Amplifier AM-3924(P)/URT, Bottom View, Component Locations

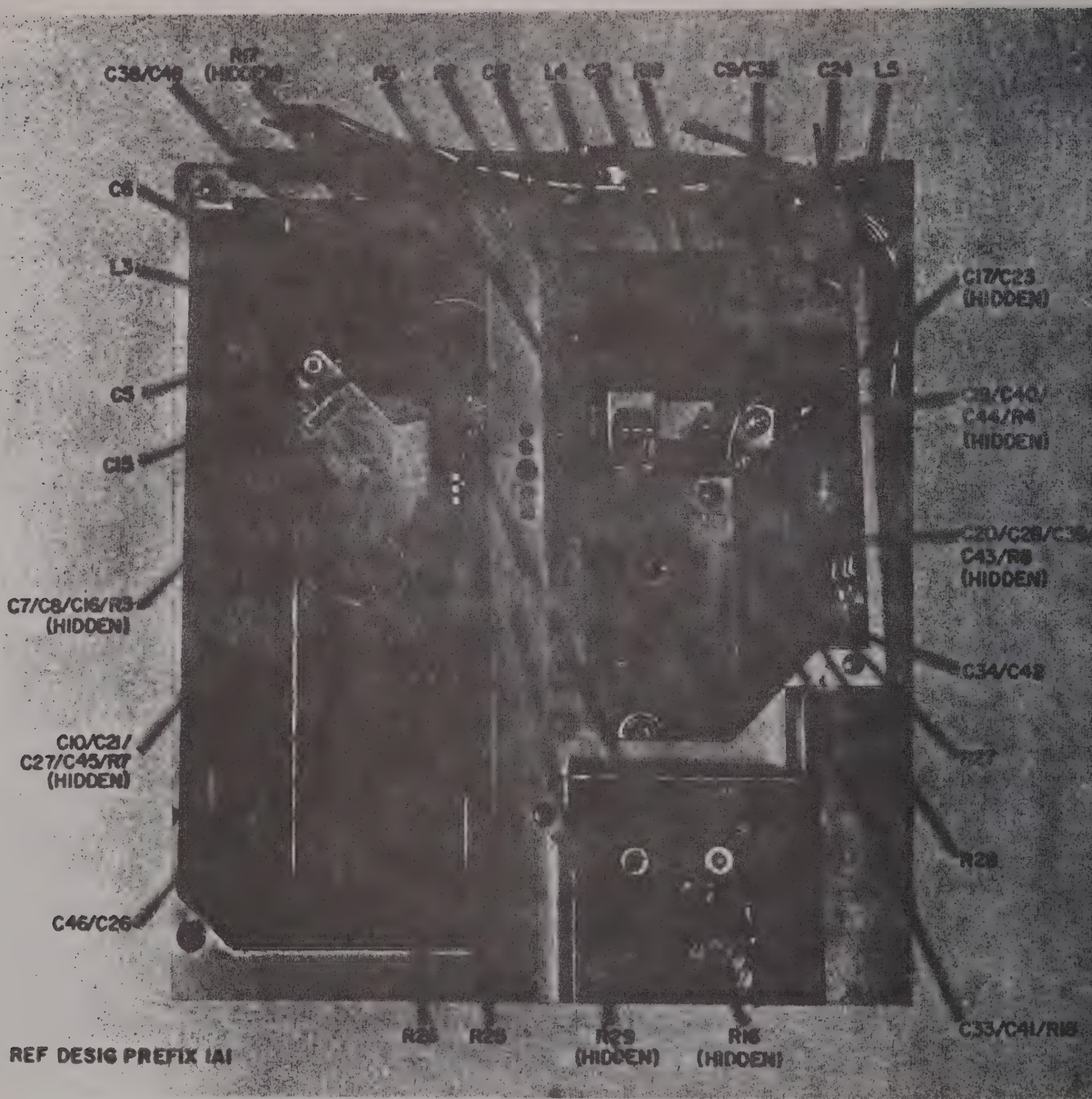


Figure 5-9. Final Amplifier Tube Socket Assembly, Bottom View, Component Locations

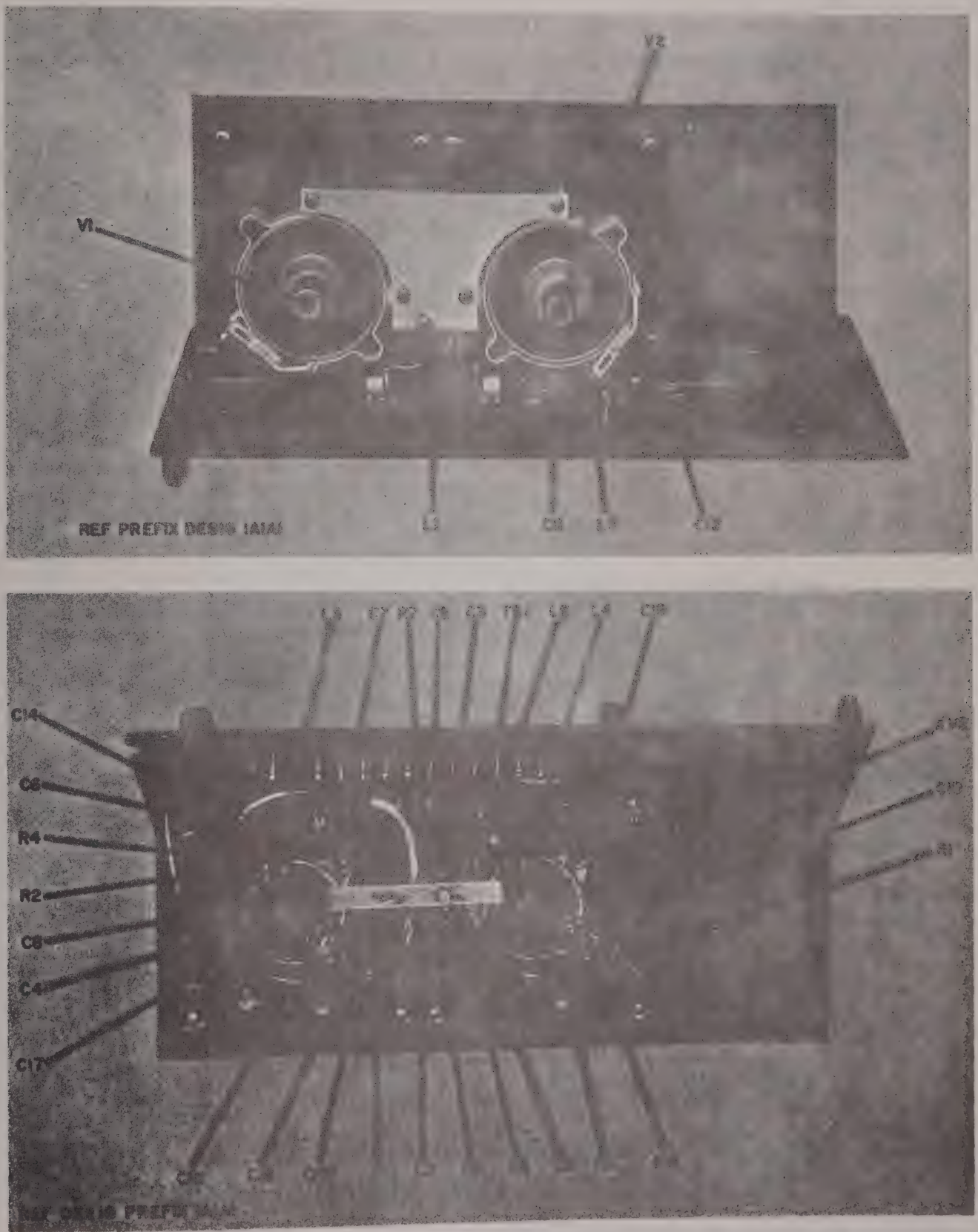


Figure 5-10. Driver Tube Assembly 1A1A1 Component and Test Point Locations

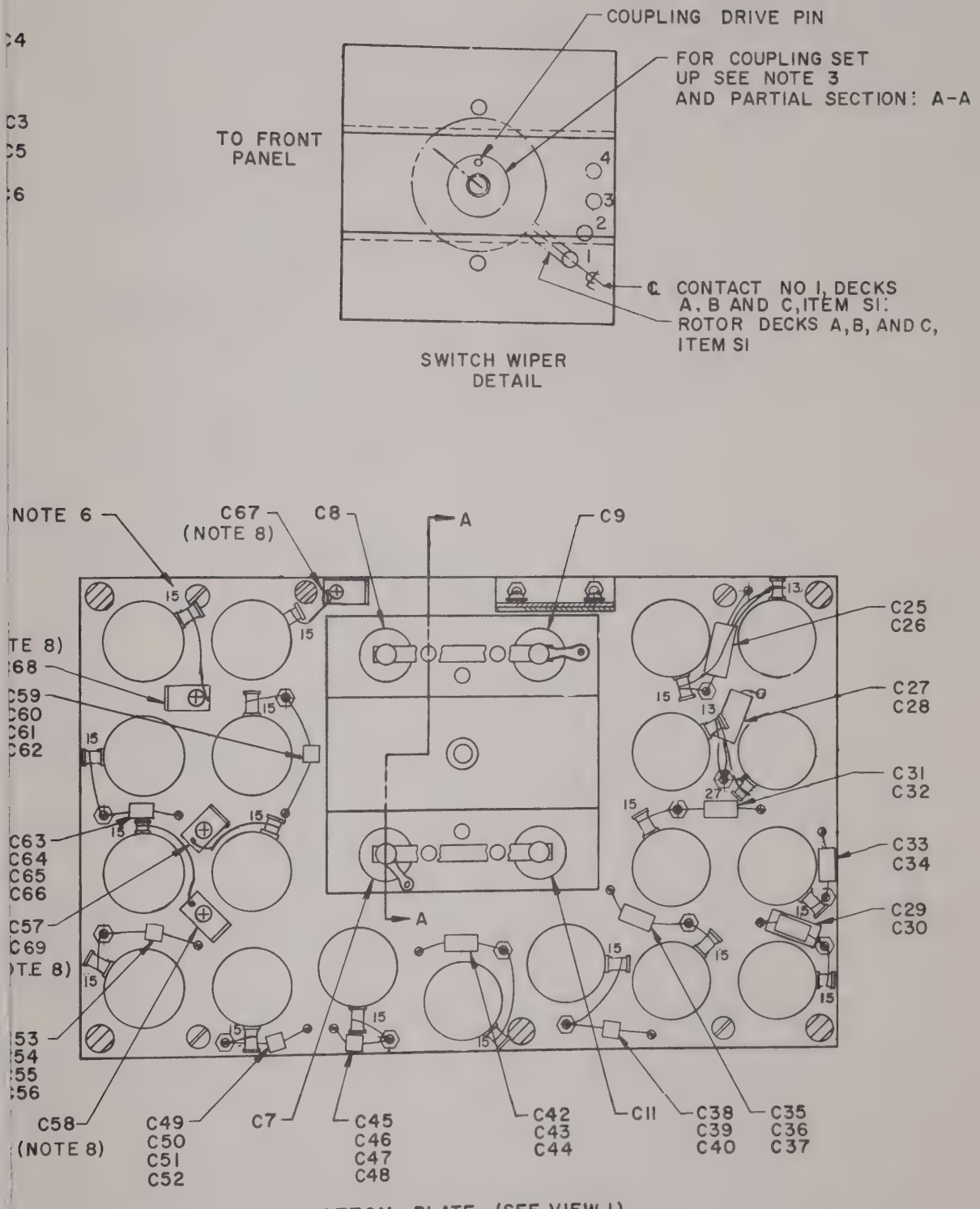
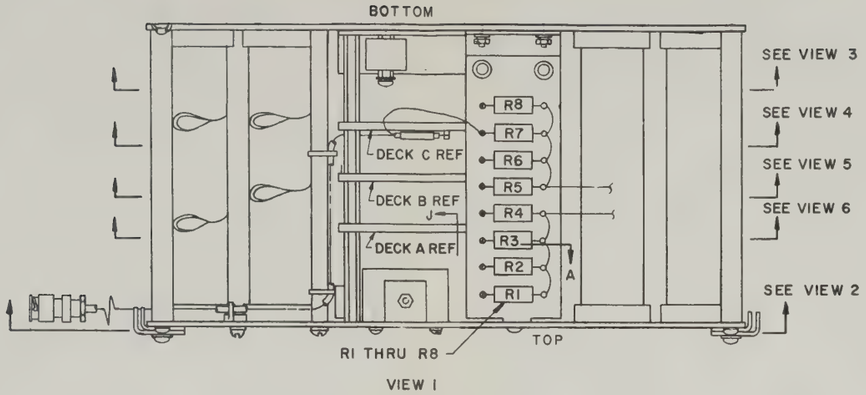
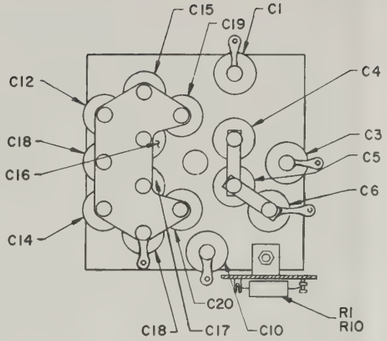


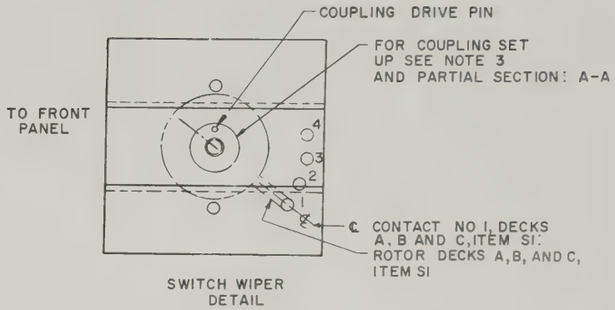
Figure 5-11. Final Transformer Assembly 1A1A2, Component and Test Point Locations (Sheet 1 of 2)



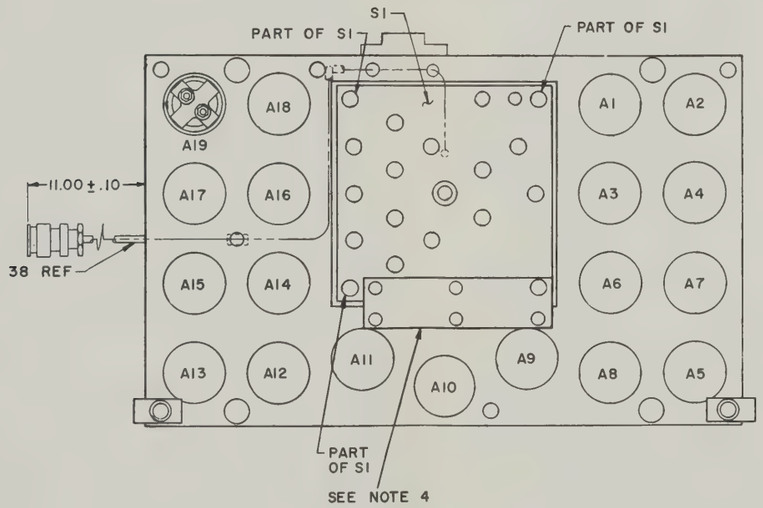
VIEW 1



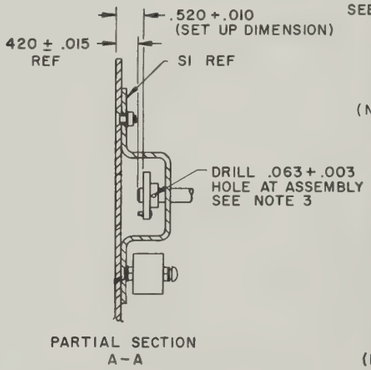
TOP
SWITCH PLATE
DETAIL
(SEE VIEW 3)



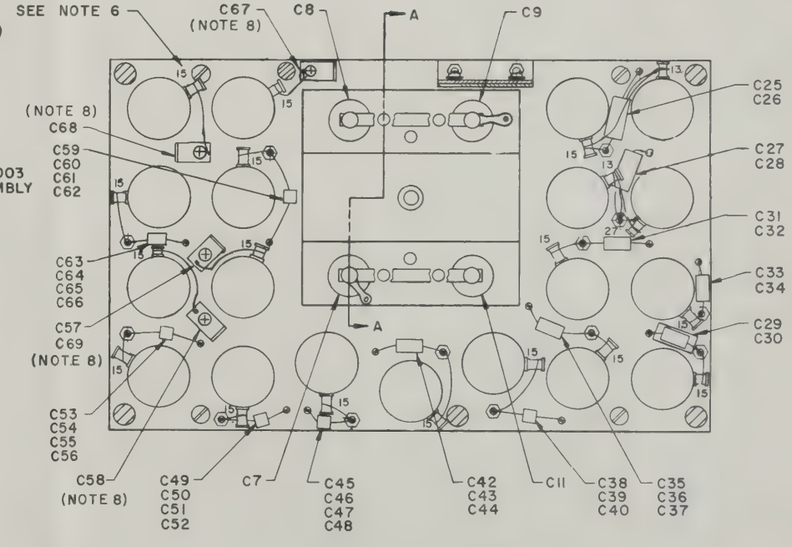
SWITCH WIPER
DETAIL



VIEW 2



PARTIAL SECTION
A-A



BOTTOM PLATE (SEE VIEW 1)

VIEW 3

Figure 5-11. Final Transformer Assembly 1A1A2, Component and Test Point Locations (Sheet 1 of 2)

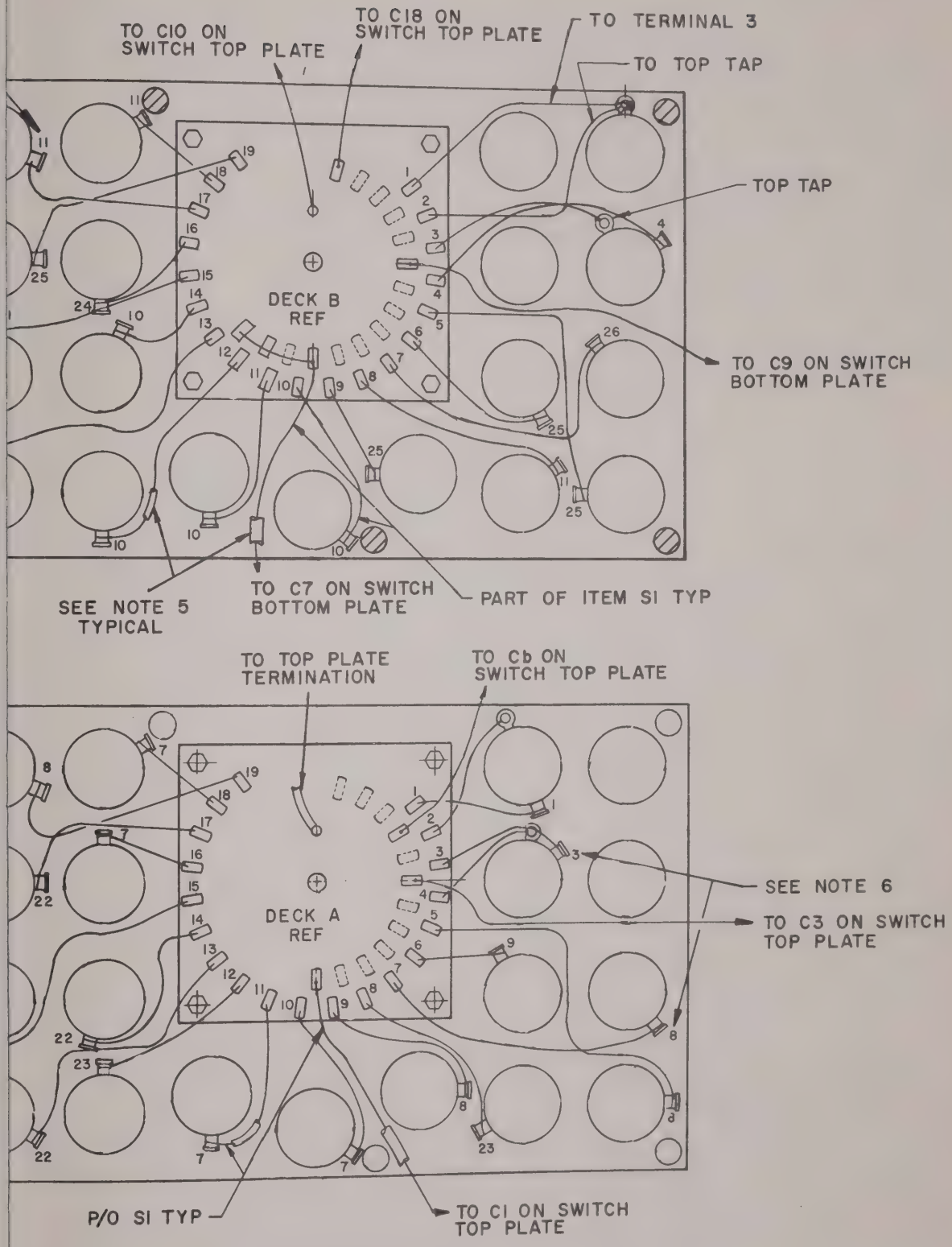
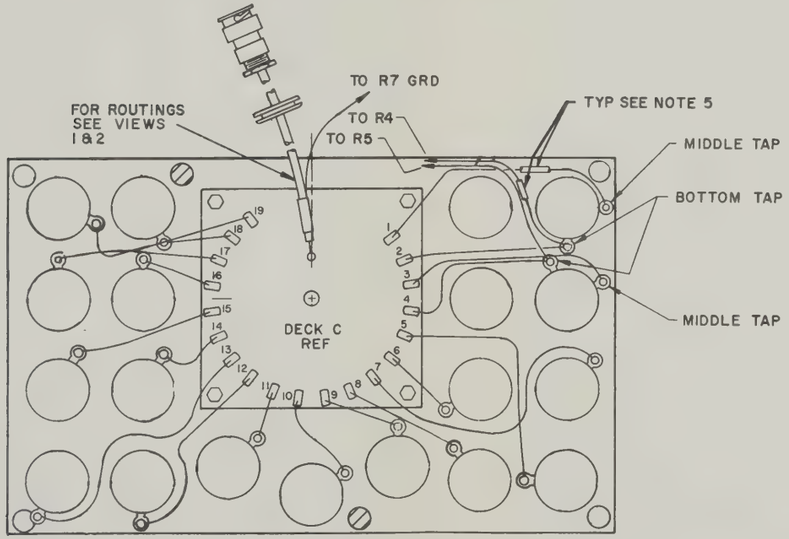


Figure 5-11. Final Transformer Assembly 1A1A2, Component and Test Point Locations (Sheet 2 of 2)

NOTES:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH 1A1A2
2. DRESS OF ALL COIL CONNECTIONS IS CRITICAL. IF LEADS MUST BE MOVED, REPLACE IN PRECISELY THE SAME LOCATION.
3. COUPLING SETUP-AFTER PINNING, COUPLING DRIVE PIN SHALL BE ORIENTED AS SHOWN & ROTORS ON SWITCH DECKS SHALL CENTER ON THEIR CONTACTS WITHIN ± 1° HEIGHT OF COUPLING TO BE AS SHOWN.
4. SHIM AS REQUIRED TO COMPENSATE FOR HEIGHT DIFFERENCE.
5. NO. 10 TEFLON TUBING SHALL COVER ALL BARE NO. 12 GAGE WIRE.
6. NUMBER SHOWN ADJACENT TO COIL TERMINAL IS THE HOLE ON COIL FORM IN WHICH THAT TERMINAL IS LOCATION.
7. ALL CONNECTIONS TO TRANSFORMER ASSYS (A1-A19) SHALL BE MADE WITH HIGH TEMPERATURE SOLDER, COMPOSITION Ag 1.5 PER QQ-S-571.
8. HARDWARE ON CAPACITOR HEATSINKS MUST BE TIGHT TO INSURE ADEQUATE COOLING.



VIEW 4
(DECK C)

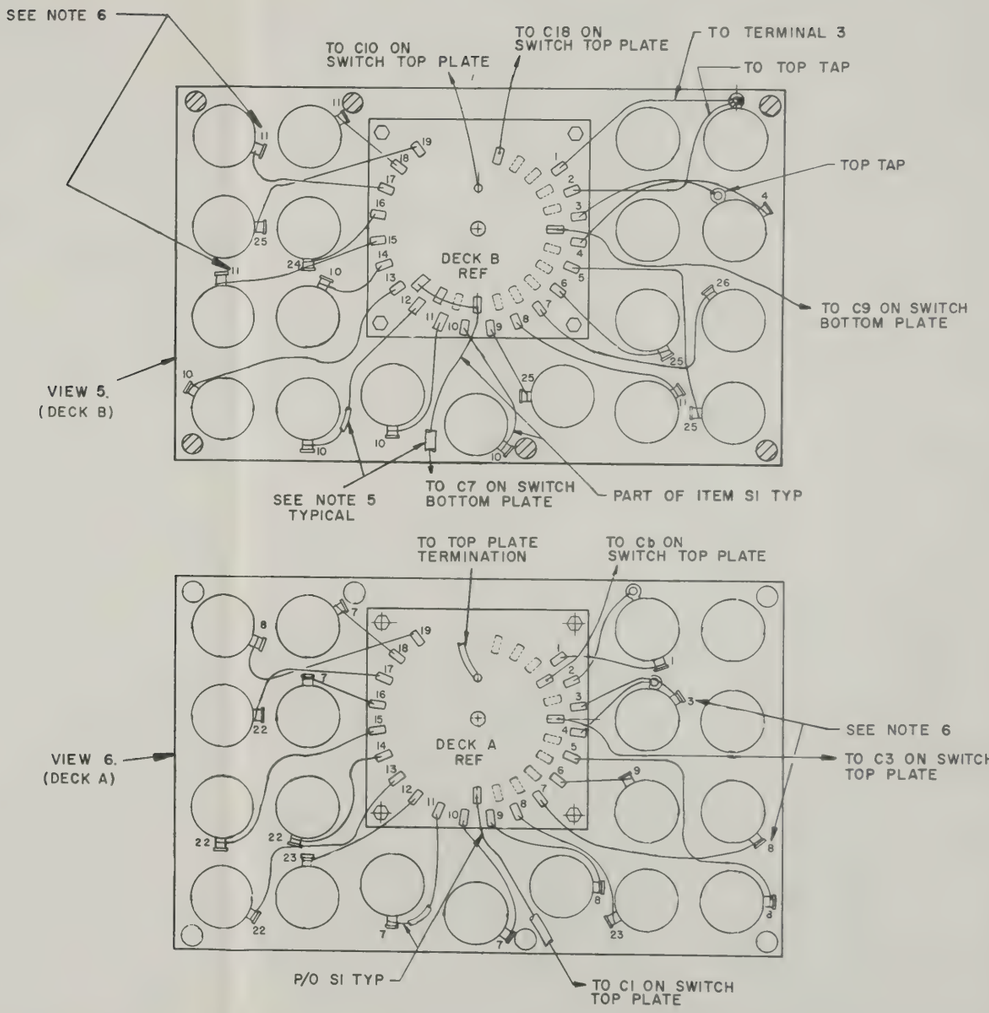


Figure 5-11. Final Transformer Assembly 1A1A2, Component and Test Point Locations (Sheet 2 of 2)

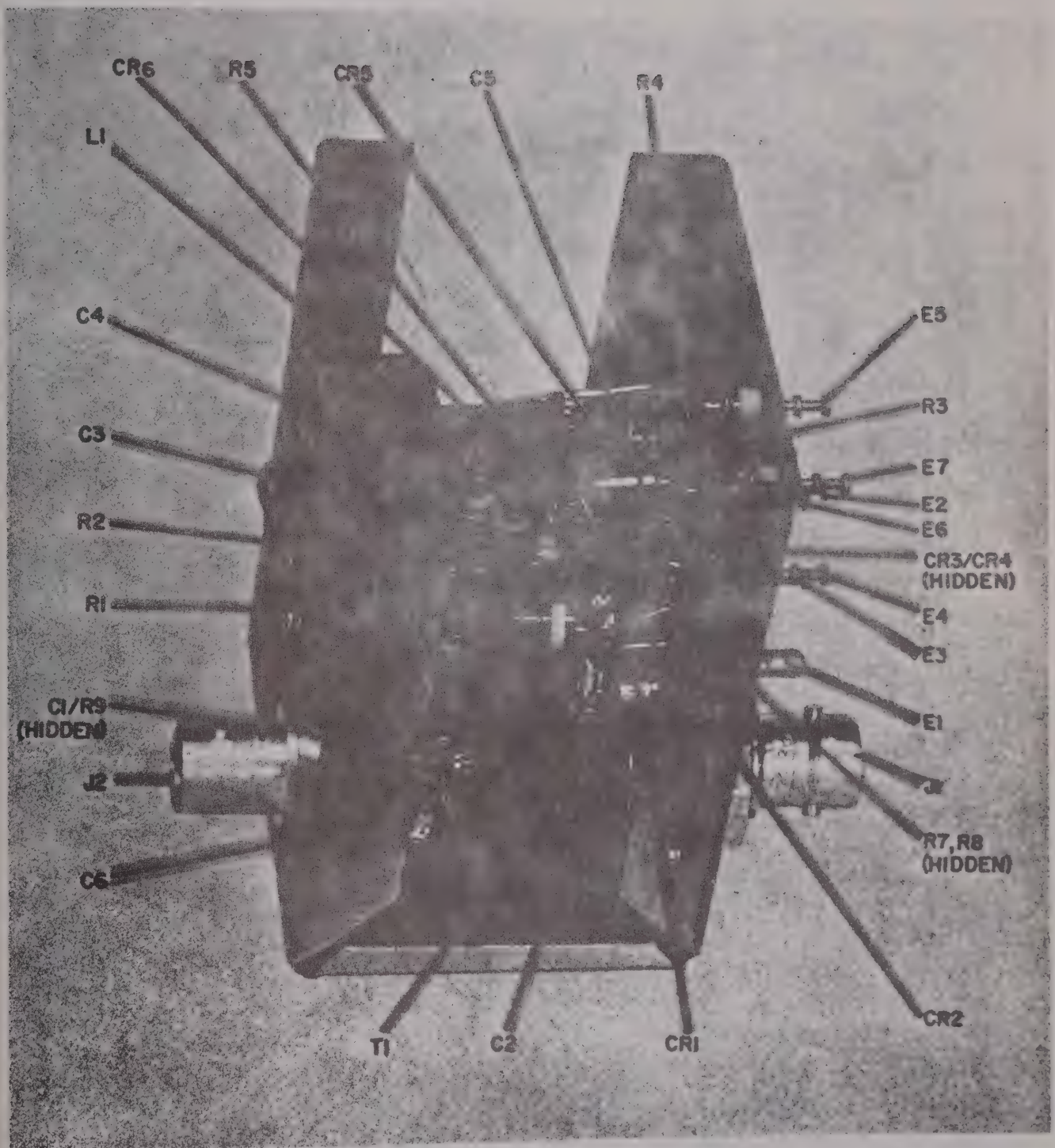


Figure 5-12. VSWR Bridge Assembly 1A1A3, Component and Test Point Locations

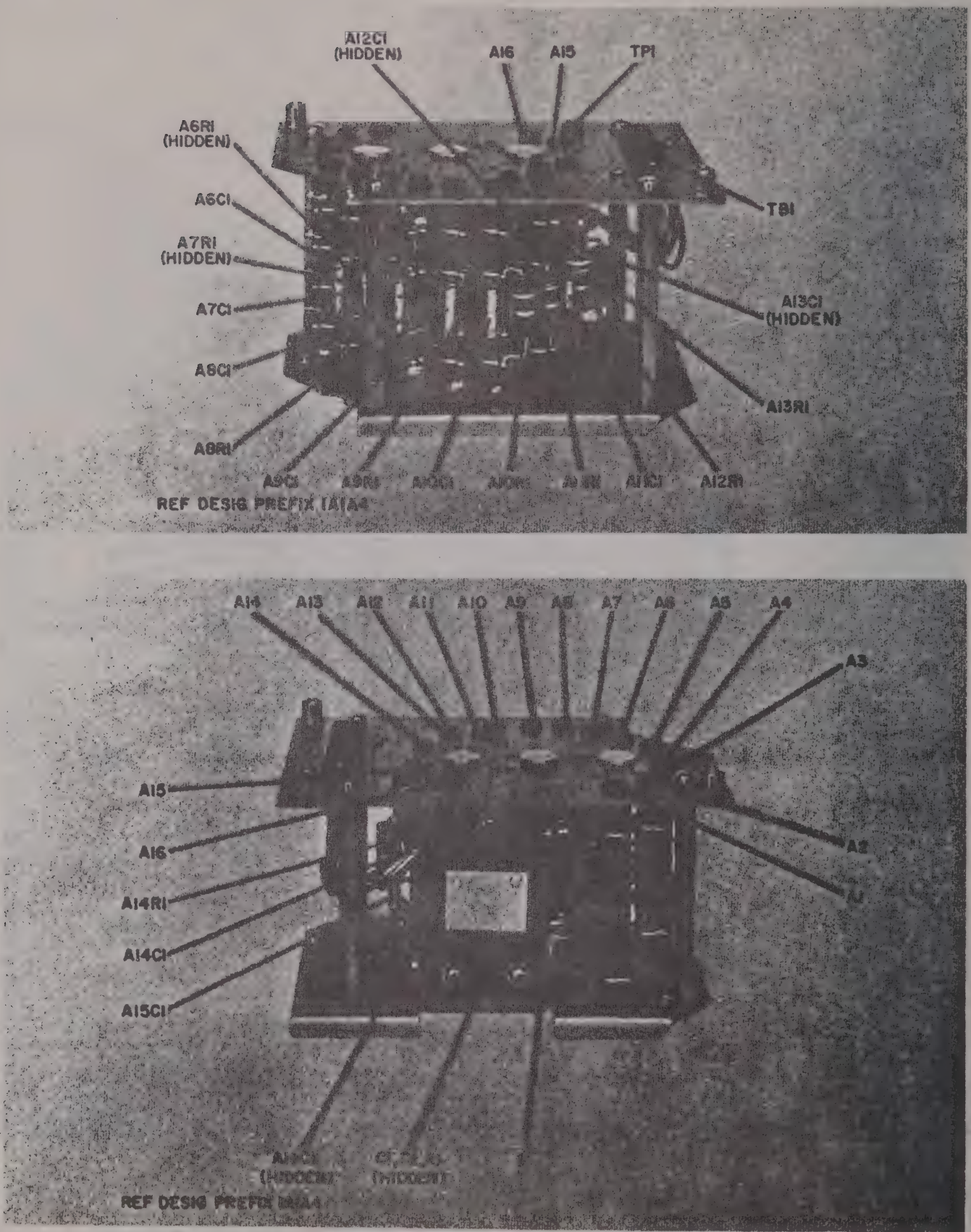
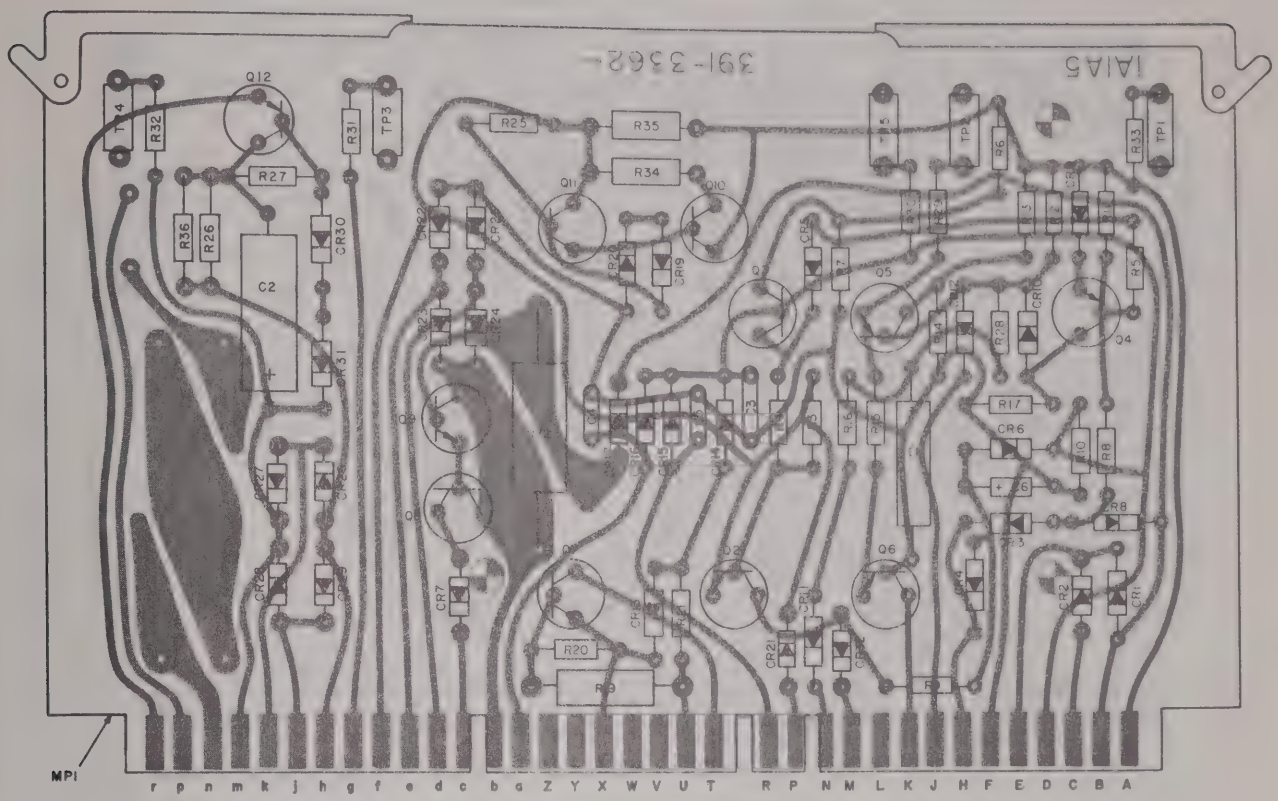


Figure 5-13. Driver Transformer Assembly 1A1A4, Component and Test Point Locations

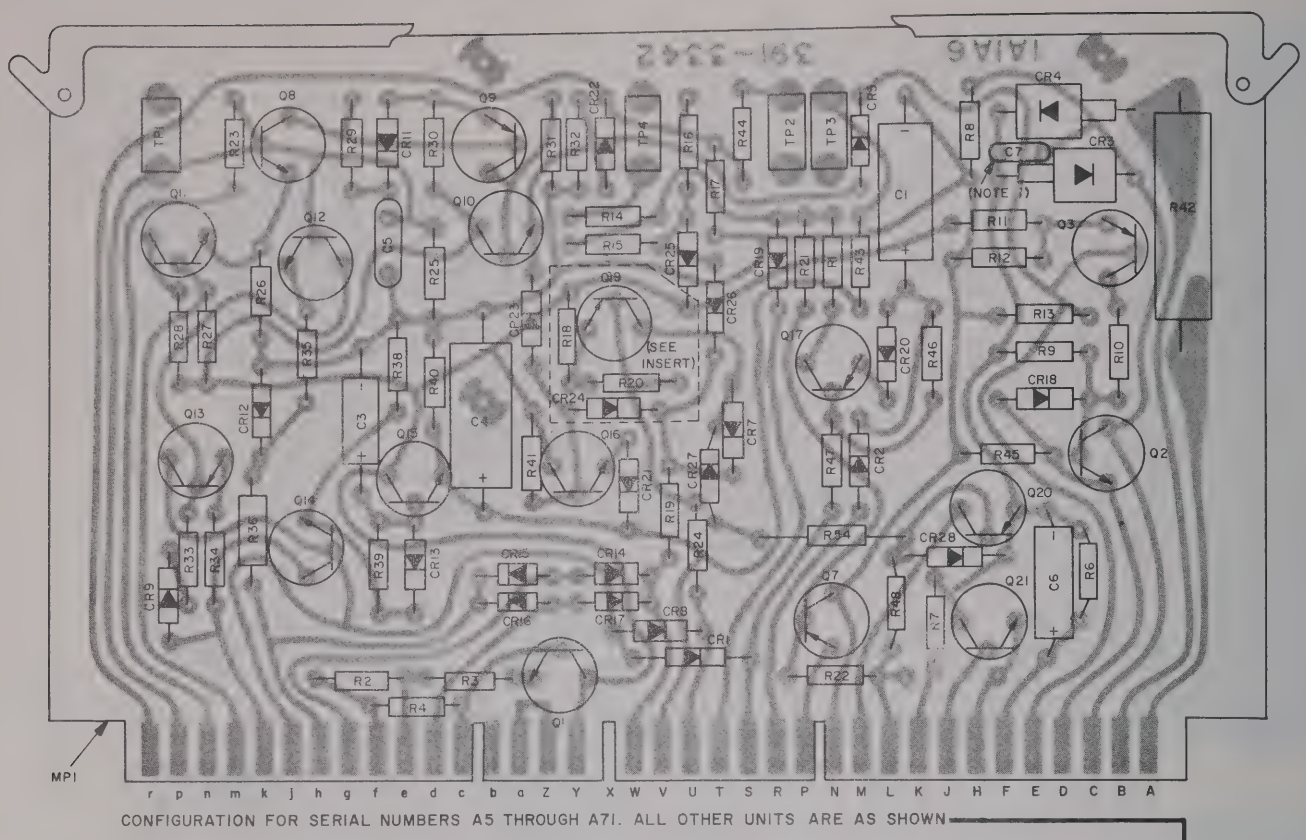


REF DESIG PREFIX
1A1A5

PIN CALLOUTS

A - 11 VDC
B - Red Keyline Interlock
C - Motor Relay Coil
D - High Voltage Detector
E - Decoder Ground
F - Chassis Ground
H - Reset
J - Bias Interlock
K - Keyer Output
L - (not used)
M - Overload Circuit
N - Keyline
P - 16 VAC
R - 1A1V1 Cathode Current
S - (S is keyway)
T - Operate Relay Coil
U - 20 VDC Operate
V - (not used)
W - (not used)
X - Power Supply Interlock
Y - (not used)
Z - (not used)
a - 1A1V2 Cathode
b - 28 VDC Output
c - 28 VDC Interlock
d - 32 VAC
e - 32 VAC
f - 20 VDC
g - -12 VDC Remote
h - 12 VDC Remote Regulator Supply
j - 16 VAC
k - 16 VAC
m - +12 VDC Remote
n - (not used)
p - (not used)
r - 12 VDC Remote Regulator Drive

Figure 5-14. Printed Circuit Board 1A1A5, Component And Test Point Locations



NOTE 1: Not used in units with serial numbers A1 through A206.

REF DESIG PREFIX
1A1A6

- A - 160 VDC Input
- B - 72 VDC Output
- C - Keyer Input
- D - Driver Bias Pot (+)
- E - Bias Interlock
- F - Negative Bias to T-827/URT
- H - Bias to PA Grids
- J - PA Bias Pot Output
- K - Driver Bias Pot (-)
- L - -72 VDC Input
- M - PA Bias Pot Switched
- N - GRD
- P - Power Pot Return
- R - +28 VDC
- S - Tune Ground
- T - -2 VDC Carrier Insert
- U - CS/FSK GRD
- V - APC Output

PIN CALLOUTS

- W - Chassis GRD
- X - (X is slotted keyway)
- Y - +11 Volts
- Z - Interlock
- a - Interlock
- b - (not used)
- c - Input Power Detector
- d - 115 VAC
- e - To Input Power Meter
- f - Chassis Ground
- g - 115 VAC
- h - -160 VDC Output
- j - APC Adjust
- k - +20 VDC
- m - PPC Adjust
- n - To Power Pot.
- p - VSWR Bridge Output
- r - PPC Output

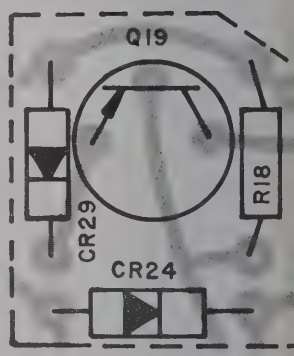
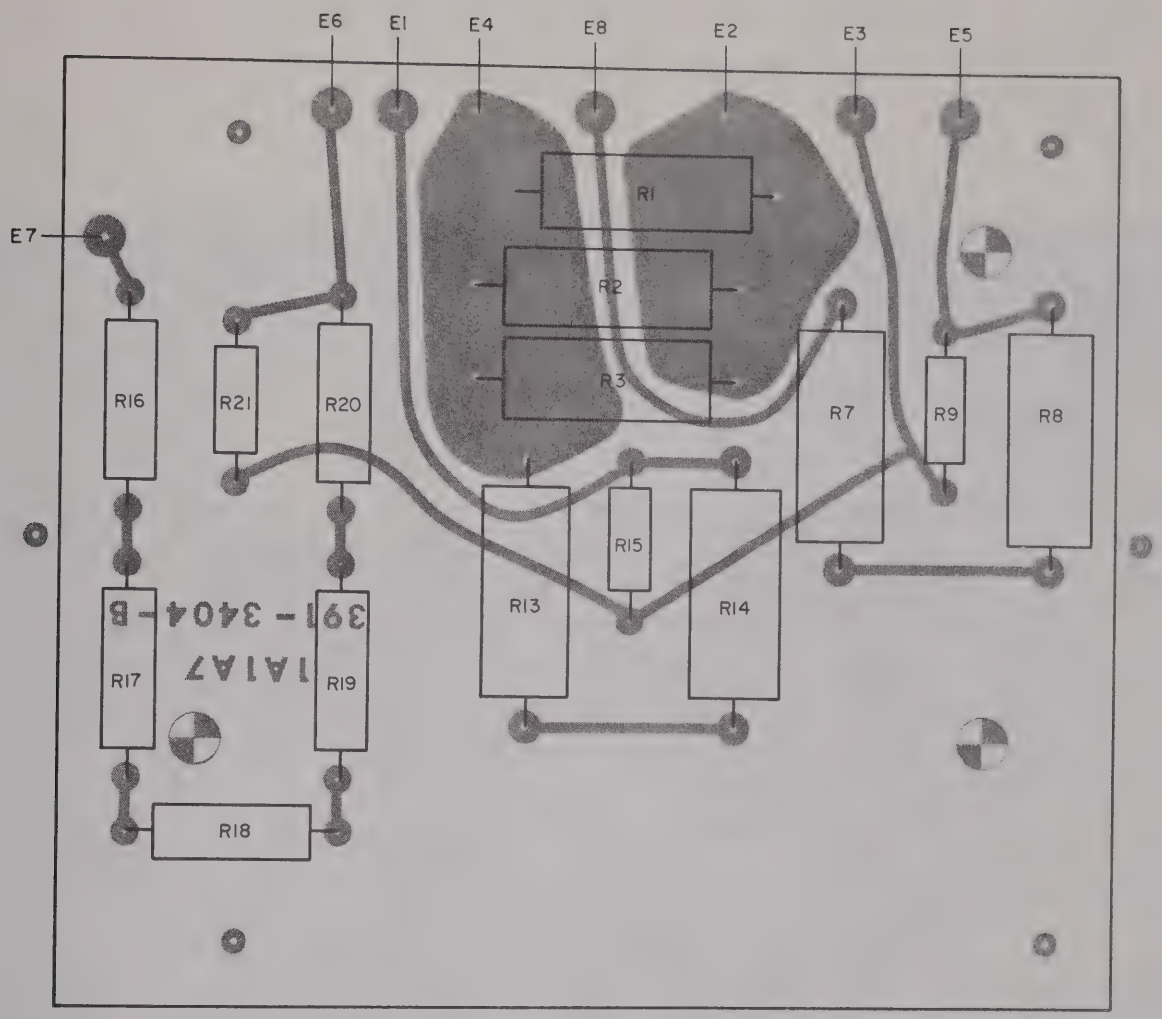


Figure 5-15. Printed Circuit Board 1A1A6, Component And Test Point Locations



REF DESIG PREFIX
1A1A7

PIN CALLOUTS

E1 - 2 VDC to 1A1S5-7*
E2 - 318 VDC to Screen Regulator
E3 - Chassis Ground
E4 - 500 VDC From 1A1XF7-2
E5 - 1.2 VDC to 1A1S5-8*
E6 - 10 VDC to 1A1S5-6
E7 - 2250 VDC From 1A1E4
E8 - 287 VDC From Screen Regulator

*Meter 1A1M1 Not Switched Into Circuit

Figure 5-16. Printed Circuit Board 1A1A7, Component And Test Point Locations

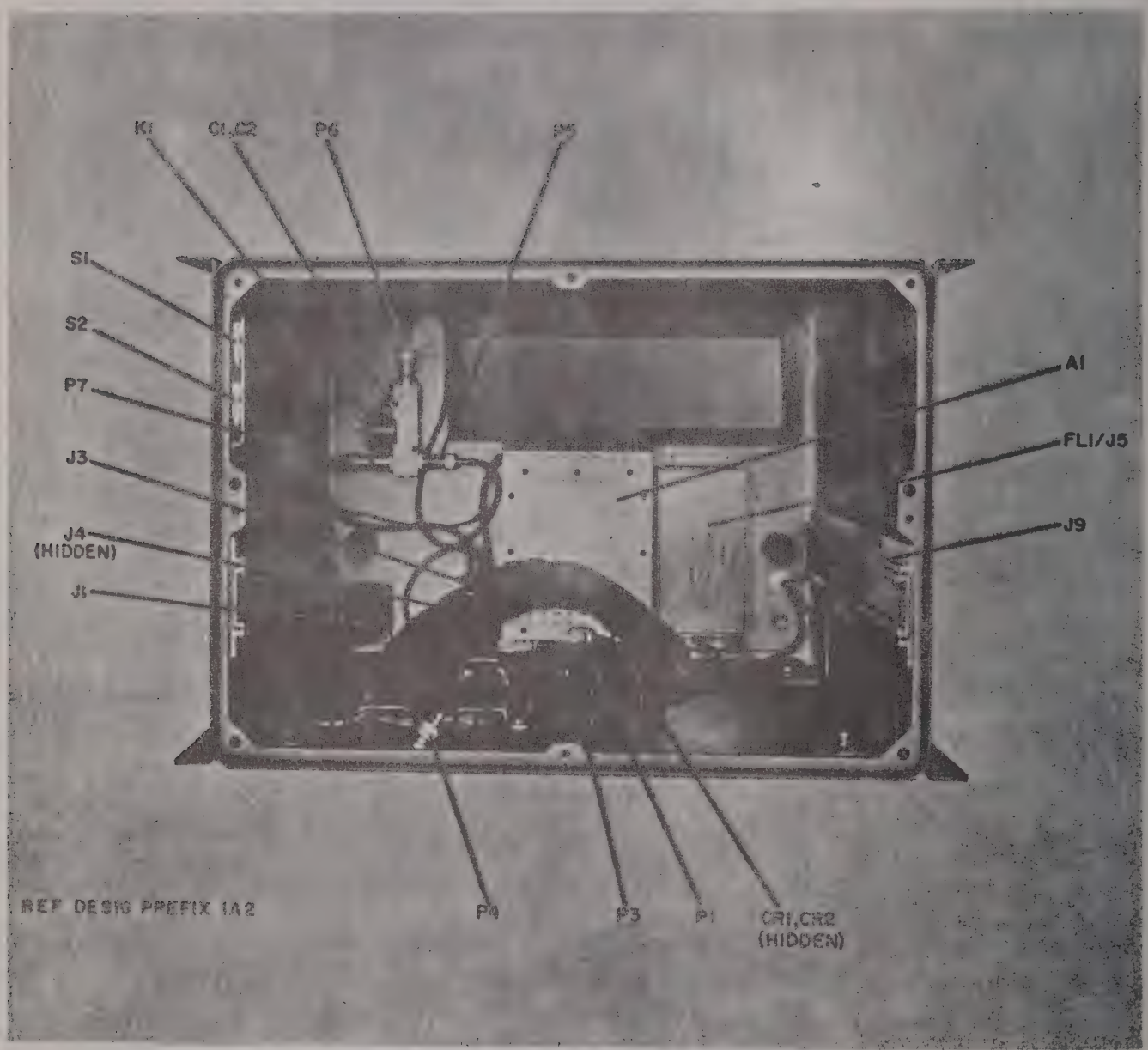


Figure 5-17. Radio Frequency Amplifier AM-3924(V)/URT, Case, Component Locations

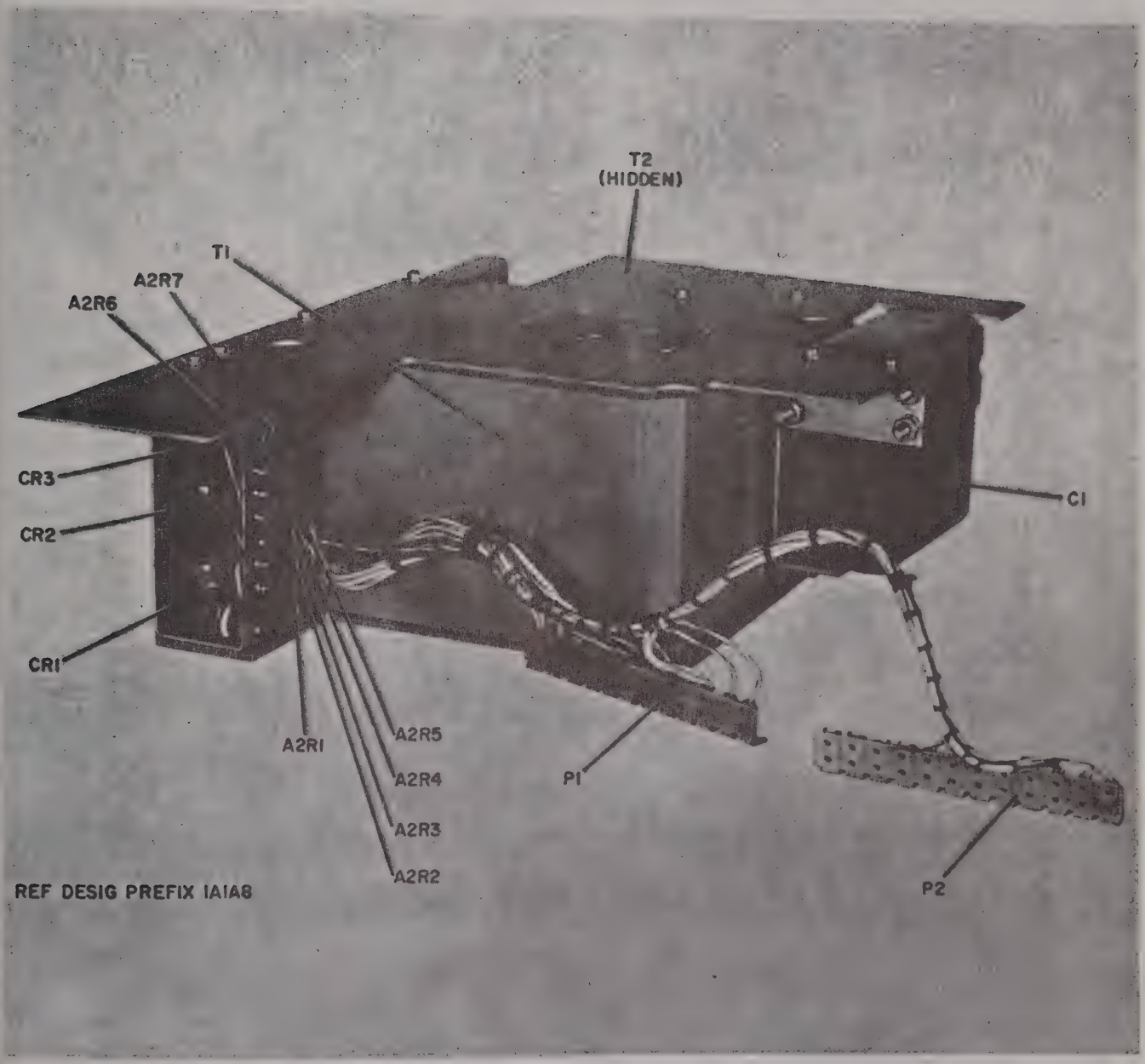


Figure 5-18. Power Supply PP-3917/UR, Component Locations

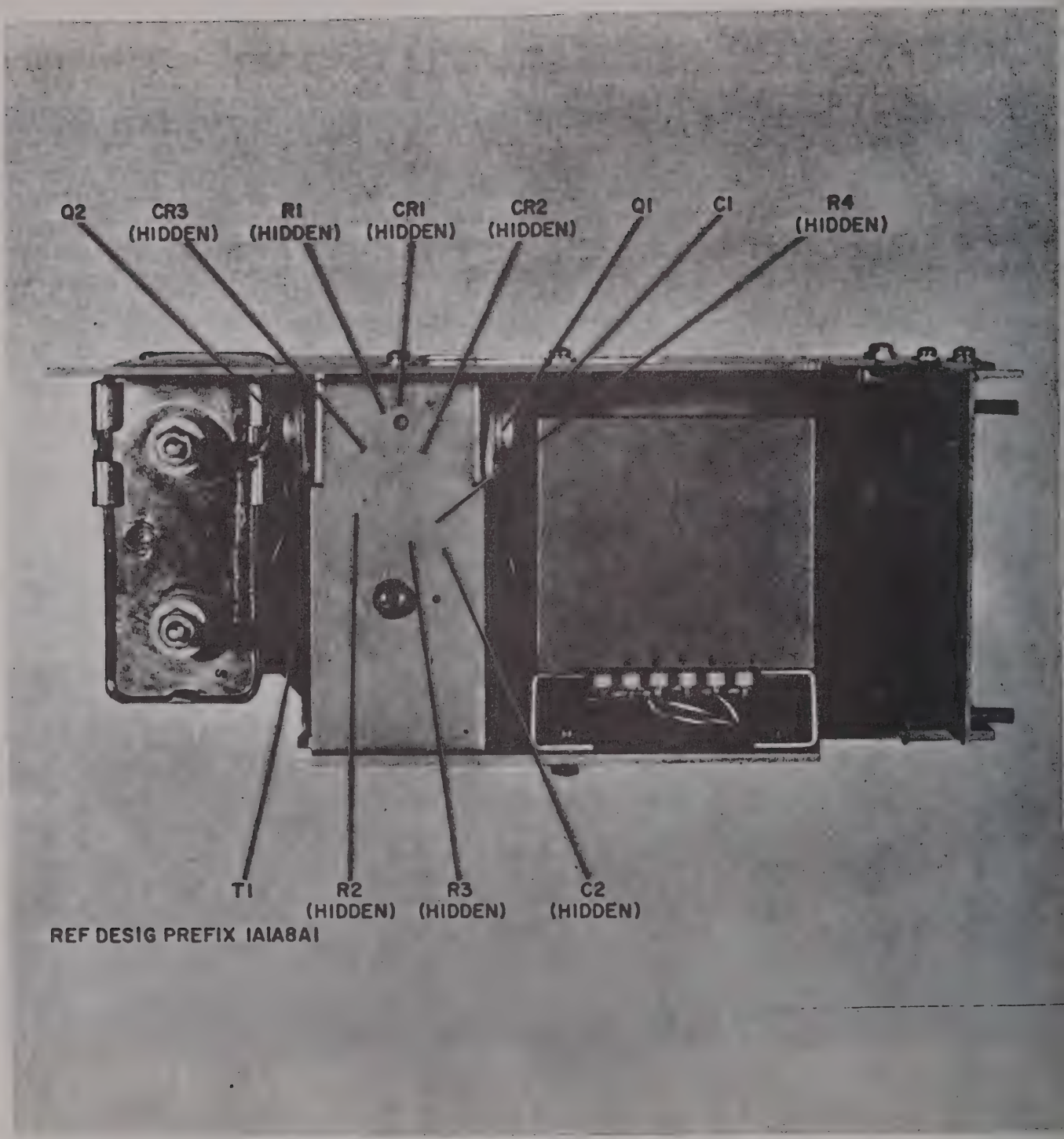
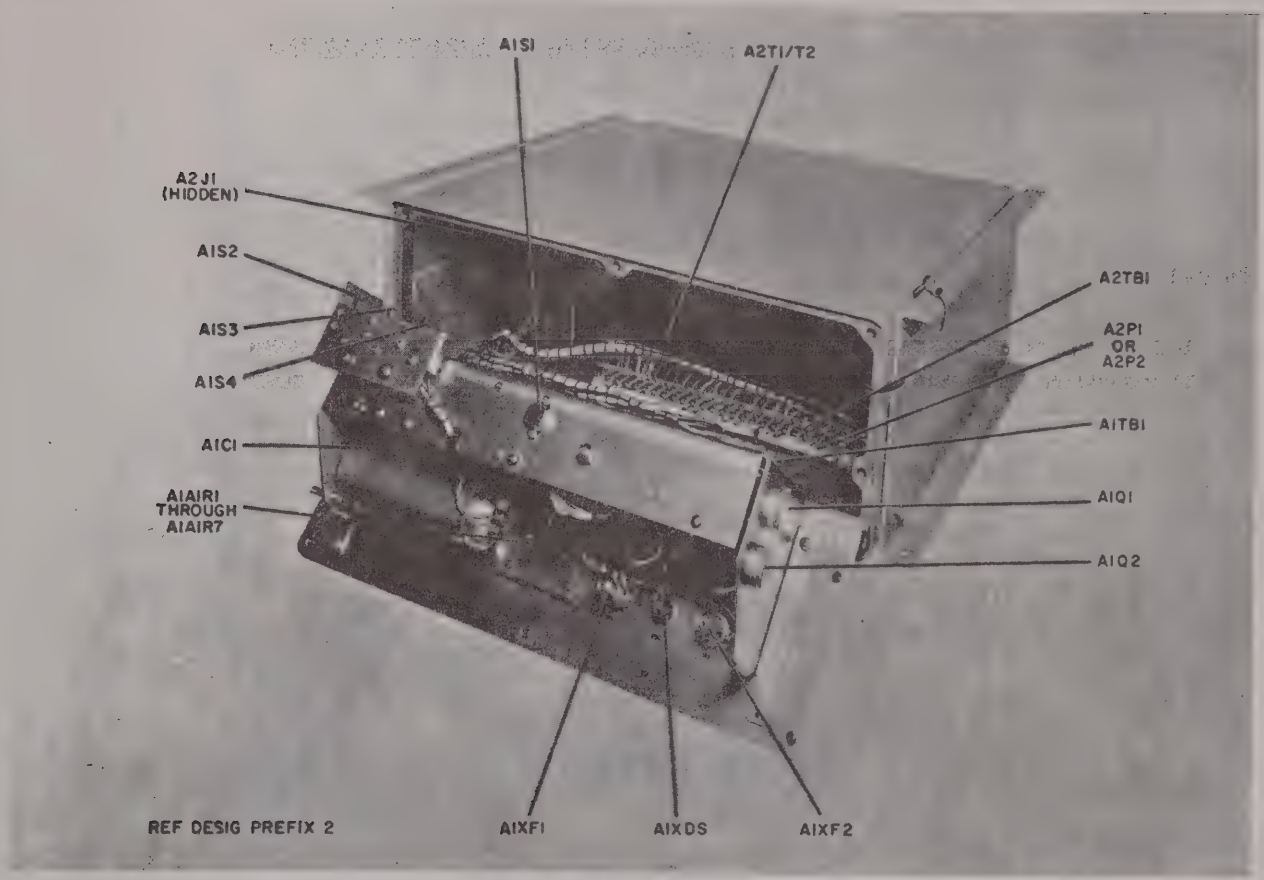


Figure 5-19. 60 CPS Inverter Assembly 1A1A8A1, Component Locations



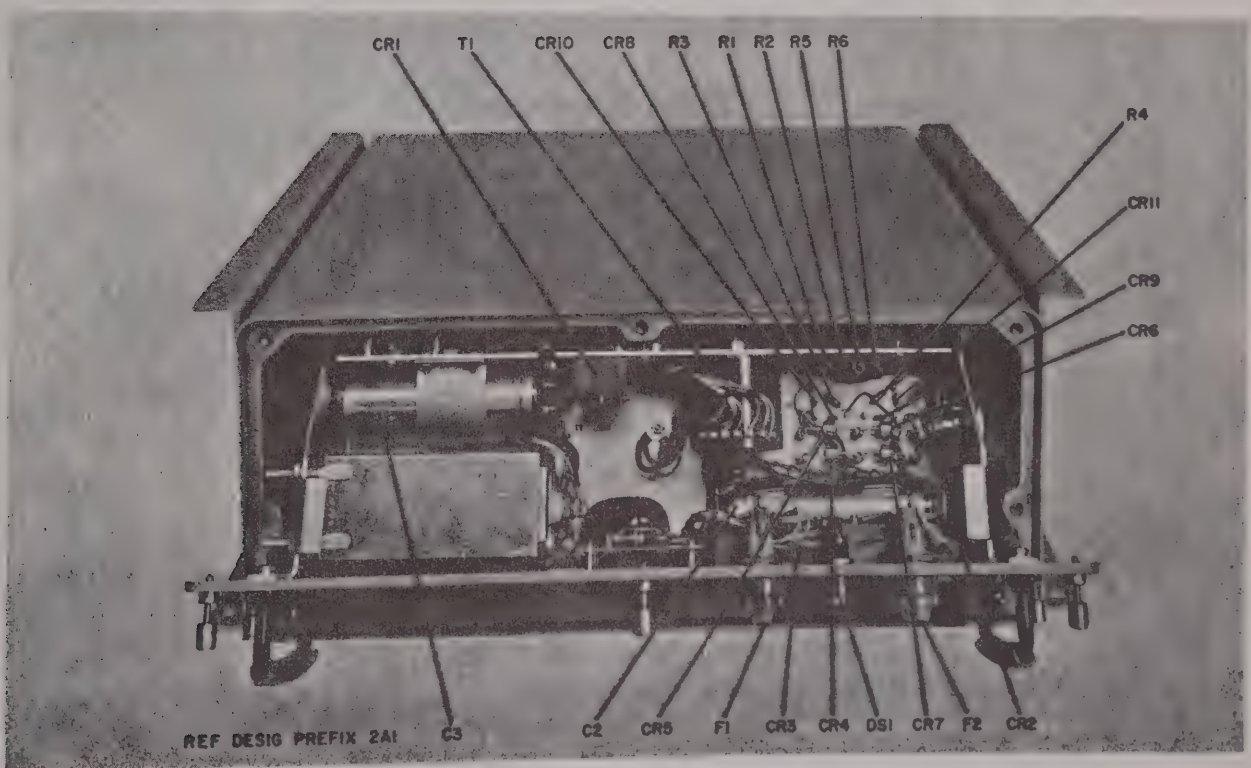


Figure 5-20. Power Supply PP-3916/UR, Component Locations

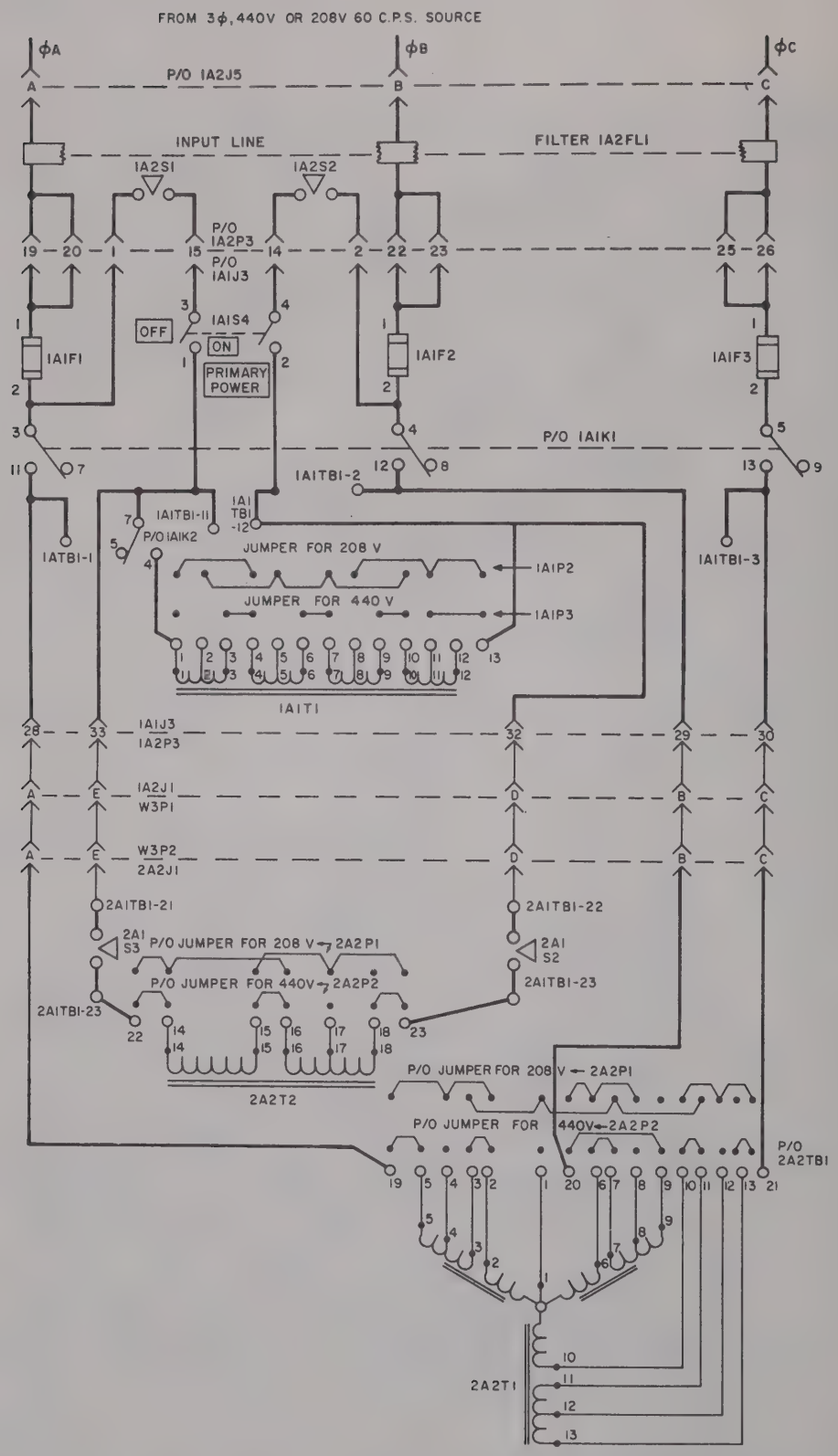


Figure 5-21. 60 CPS Primary Power Distribution Diagram

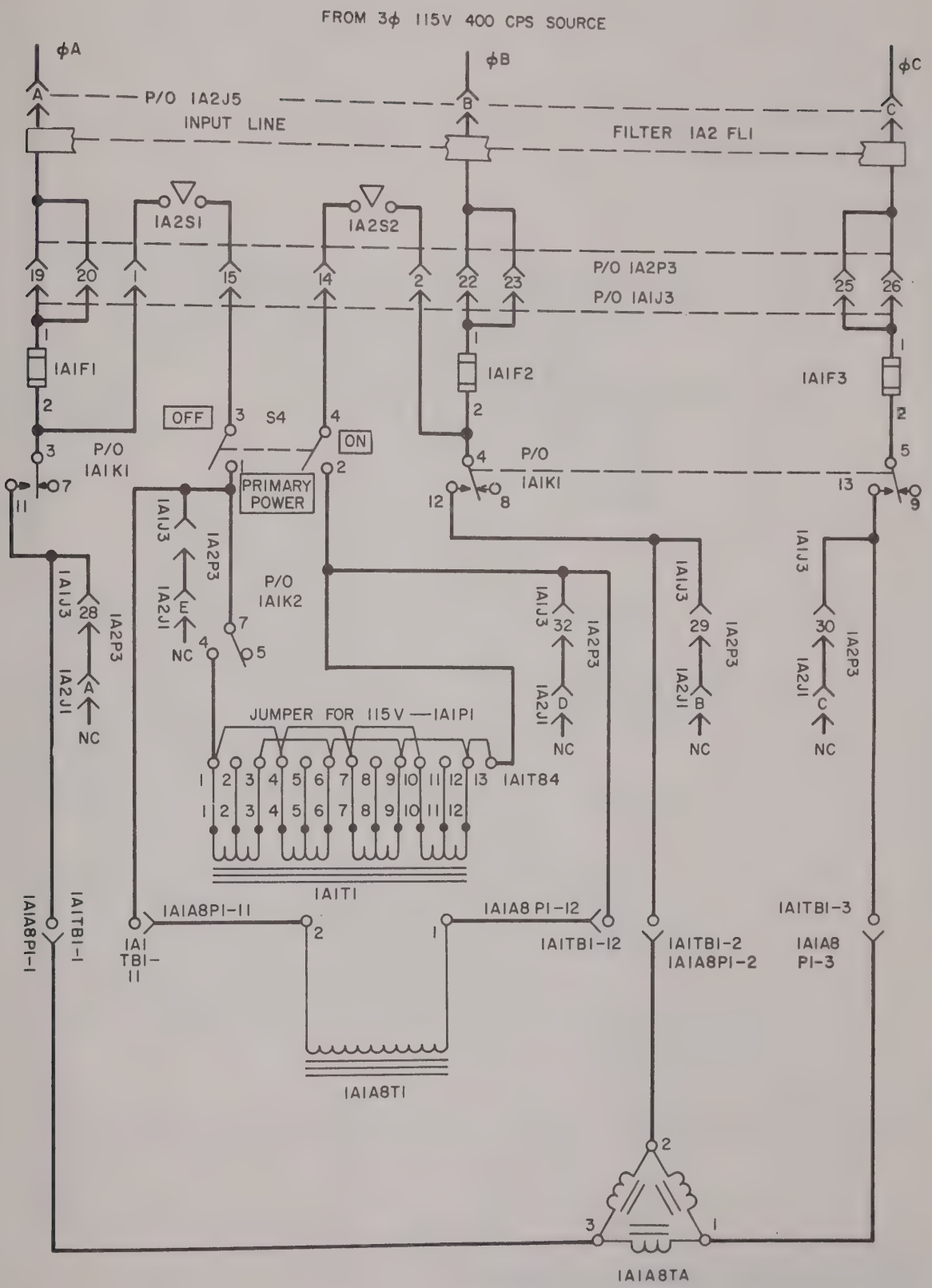


Figure 5-22. 400 CPS Primary Power Distribution Diagram

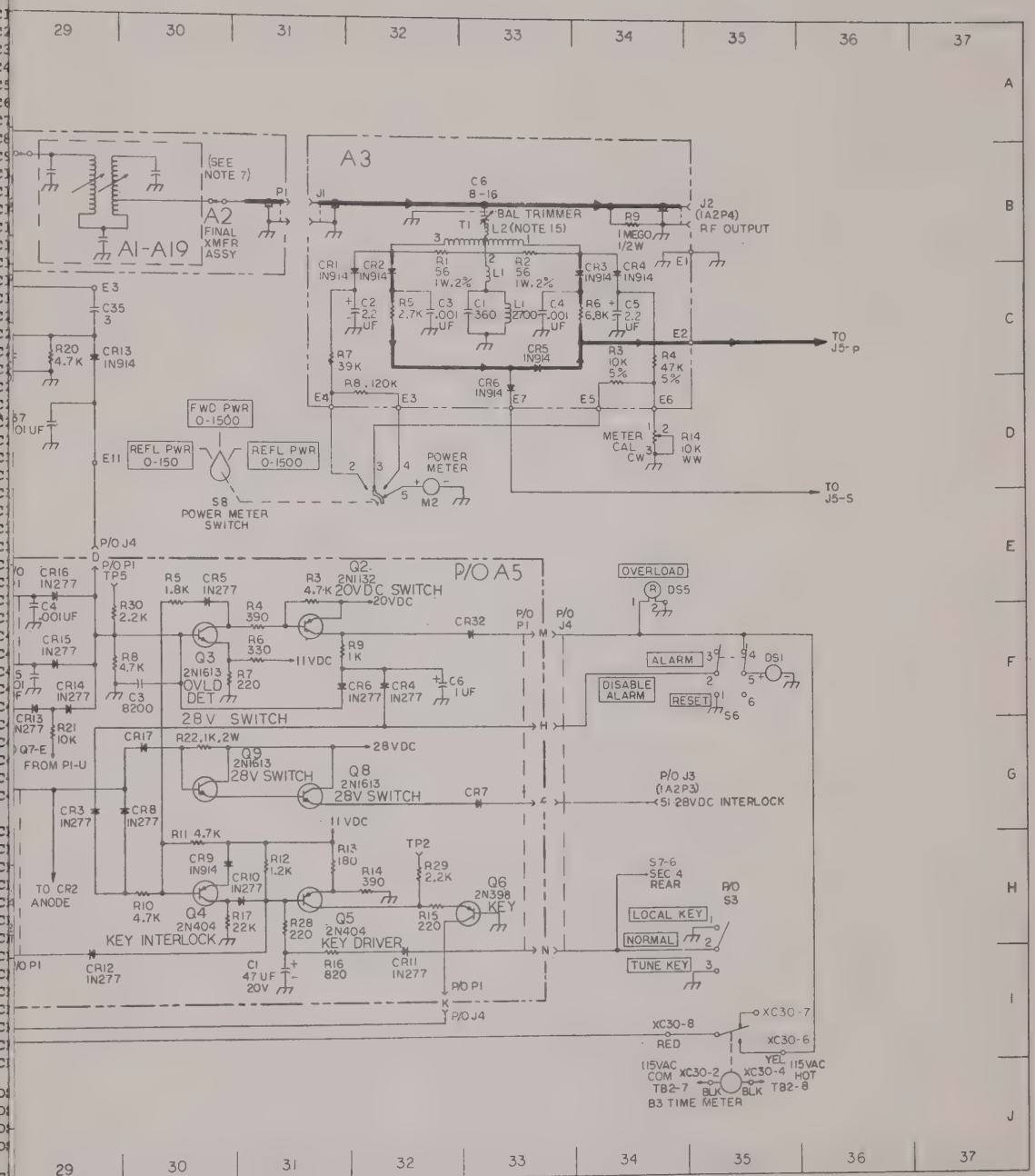


Figure 5-23. Radio Frequency Amplifier AM-3924(P)/URT Chassis, Schematic Diagram (Sheet 1 of 2)

PARTS LOCATION INDEX

REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC
B1	6C	F6/XF6	21G	J1	12H	A1R1	12C	A5R12	31H	A6Q15	44E
B2	55H	F7/XF7	4G	J6	35F	A1R2	11C	A5R13	31H	A6Q16	45E
B3	35J	J1	3B	J7	54B	A1R3	14D	A5R14	32H	A6Q17	41G
C1	7C	J3	3B-J,12I, 20B,21B,27E, 27H,27J,28G, 34G,39G,47C, 8J,9J,52C-F, 55G,55G-J	J8	81D	A1R4	18E	A5R15	32H	A6Q19	45G
C2	22B			J9	9G	A1R5	12C	A5R16	31H	A6Q20	25D
C3	22B					A1R6	14C	A5R17	30H	A6Q21	26E
C4	20B			TB1	39G	A1R7	11C	A5R18	7G		
C5	23C			TB2	62G	A1R8	12D	A5R20	7G	A6R1	41G
C6	21B	J4	7G,8G,22G-J, 26G-J,28E-H, 29H,32I,33F -H,51H	TB4	20G	A1R9	14B	A5R21	29G	A6R2	11G
C7	21C							A5R22	30G	A6R3	11G
C8	23C			A2T1	33B			A5R25	24G	A6R4	10F
C9	26C					A4TB1	56C	A5R26	25I	A6R5	24E
C10	22C	J5	10F,10G,11G, 22I,22D,22E, 24G,26D-F, 40C-H,47C-I					A5R27	25I	A6R6	26F
C11	23B							A5R28	31H	A6R8	23E
C12	24C			A3C1	31I	A5R29	32H	A6R9	25F
C13	25C			A3C2	24I	A5R30	30F	A6R10	25F
C15	23B			A3C3	24H	A5R31	26J	A6R11	24E
C16	23B	J6	16I	A3C4	40B	A5R32	25H	A6R12	25F
C17	26C	J7	16I	A3C5	23C	A5R33	26G	A6R13	24F
C19	26C	J8	16H	A3C6	27D	A5R34	25G	A6R14	43G
C20	28C	J10	16H	A3C7	12C	A5R35	26G	A6R16	43H
C21	23B	J11	16G	A3C8	12B	A5R36	24I	A6R16	43H
C23	26B			A3C9	12D			A6R17	43H
C24	28B	K1	6F	A3C10	12D	A5TP1	26G	A6R18	44G
C25	23B	K2	10I	A3C11	12D	A5TP2	32H	A6R19	44G
C27	23C	K3	53I	A3C12	14D	A5TP3	25J	A6A21	42B
C28	27D	K4	6G	A3C13	19E	A5TP4	26I	A6R22	42I
C29	22E	L1	22B	A3D14	13D	A5TP5	30E	A6R23	40C
C30	27B	L2	22B	A3D17	10D			A6R24	45G
C31	27G	L3	22B	A3D18	10C	A5CR1	13H	A6R25	41C
C32	26B	L4	24C	A3D19	14C	A5CR11	13H	A6R26	41C
C33	26B	L5	27B			A5CR12	29I	A6C5	40D	A6R27	42D
C34	26B	L6	24B	A1CR1	13D	A5CR13	29F	A6C6	25E	A6R28	42D
C35	29C			A1CR2	15D	A5CR14	29F			A6R29	41C
C36	29C	M1	14G			A5CR15	29F	A6CR1	40G	A6R30	42C
C37	29D	M2	32E	A1E1	13D	A5CR16	29E	A6CR2	41G	A6R31	42C
C38	23B			A1Q2	10B	A5CR17	30J	A6CR3	24E	A6R32	42C
C39	26B	P1	19G	A1J3	18D	A5CR19	24G	A6CR4	24E	A6R33	41E
C40	26B	P2	18G	A1Z4	12C	A5CR20	24H	A6CR5	44C	A6R34	42E
C41	26C	P3	17G	A1Z5	12C	A5CR21	24G	A6CR6	44C	A6R35	41E
C42	26C	P4/P5	63F	A1Z6	11D	A5CR22	23G	A6CR7	44G	A6R36	41E
C43	26C	P6	21B			A5CR23	24G	A6CR8	45F	A6R38	42F
C44	26C	P7	20B	A1R1	12D	A5CR24	24H	A6CR9	41E	A6R39	43F
C45	23C			A1R2	12C	A5CR25	23H	A6CR11	41C	A6R40	44F
C46	23C	Q1	27I	A1R3	12C	A5CR26	23I	A6CR12	41F	A6R41	45D
C47	29C			A1R4	11C	A5CR27	24I	A6CR14	42D	A6R43	44E
C48	23C	R3	21C	A1R6	13C	A5CR28	24J	A6CR15	23D	A6R44	46C
C49	19E	R4	26C	A1R7	11D	A5CR29	23J	A6CR16	23E	A6R45	26F
		R5	24C	A1TB1	9B,10E, 14C	A5CR30	25I	A6CR17	23E	A6R46	41G
C51	6F	R8	25C			A5CR31	24I	A6CR18	25F	A6R47	41G
C52	10I	R7	22C			A5CR34	33F	A6CR19	45E	A6R48	25D
C53	15I	R8	27C	A1V1	11B			A6CR20	41E	A6R49	26D
C54	15I	R9	27F	A1V2	12D	A4Q2	11F	A6CR21	45E	A6R54	25D
C55	15H	R10	27D			A5Q3	30F	A6CR22	45C		
C56	15H	R11	39D	A2C1	39C	A5Q4	31E	A6CR23	45D	A6TP1	40C
C57	15I	R12	39F	A2C2	32C	A5Q5	23E	A6CR24	45D	A6TP2	46C
C58	15I	R13	39G	A2C3	32C	A5Q6	23F	A6CR25	44G	A6TP3	46E
C59	15H	R14	34D	A2C4	32C	A5Q7	7G	A6CR26	44G	A6TP4	46F
C510	15H	R16	24B	A2C5	34C	A5Q8	31G	A6CR27	44E		
C511	15G	R17	24C	A2C6	33A	A5Q9	34G	A6CR28	25D	A7R1	18F
C512	52I	R18	25B			A5Q10	25G	A6CR29	44G	A7R2	18F
C513	29C	R19	25B	A2CR1	32C	A5Q11	25G			A7R3	18E
C514	53G	R20	29C	A2CR2	32C	A5Q12	26I	A6Q1	10F	A7R4	17F
		R21	24B	A2CR3	34C			A6Q2	25F	A7R8	16F
D61	35F	R24	15B	A2CR4	34C	A5R3	31E	A6Q3	25F	A7R9	16F
D62/XD62	7C	R25	23C	A2CR5	33C	A5R4	31F	A6Q7	41E	A7R13	17E
D63/XD63	6C	R26	24C	A2CR6	33D	A5R5	29E	A6Q8	41C	A7R14	16E
D65/XD65	34E					A5R6	31F	A6Q9	42C	A7R15	16E
		R27	25C	A3P1	31B	A5R7	31F	A6Q10	42C	A7R16	17D
F1/XF1	5E	R28	25C	A3J2	15B	A5R8	30F	A6Q11	41D	A7R17	17D
F2/XF2	5E					A5R9	32F	A6Q12	41E	A7R18	17D
F3/XF3	5F	S1	8G			A5R10	33H	A6Q13	42E	A7R19	16D
F4/XF4	8C	S3	35B,39G	A5J1	33C	A5R11	30H	A6Q14	42E	A7R20	16D
F5/XF5	64B	S4	51	A5J4	33B					A7R21	16E

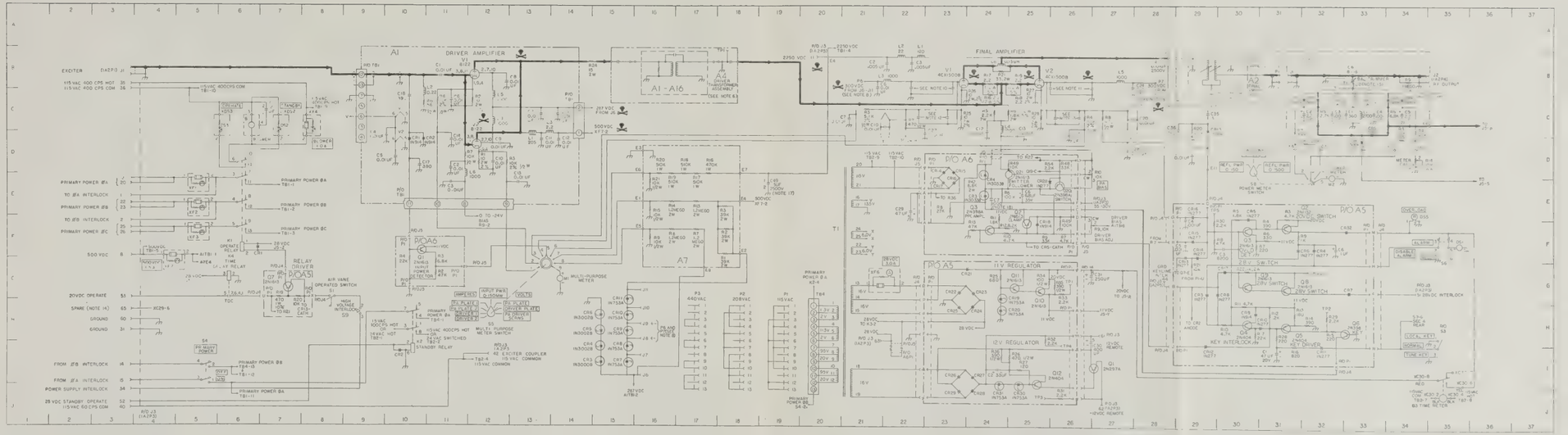


Figure 5-23. Radio Frequency Amplifier AM-3924(P)/URT Chassis, Schematic Diagram (Sheet 1 of 2)

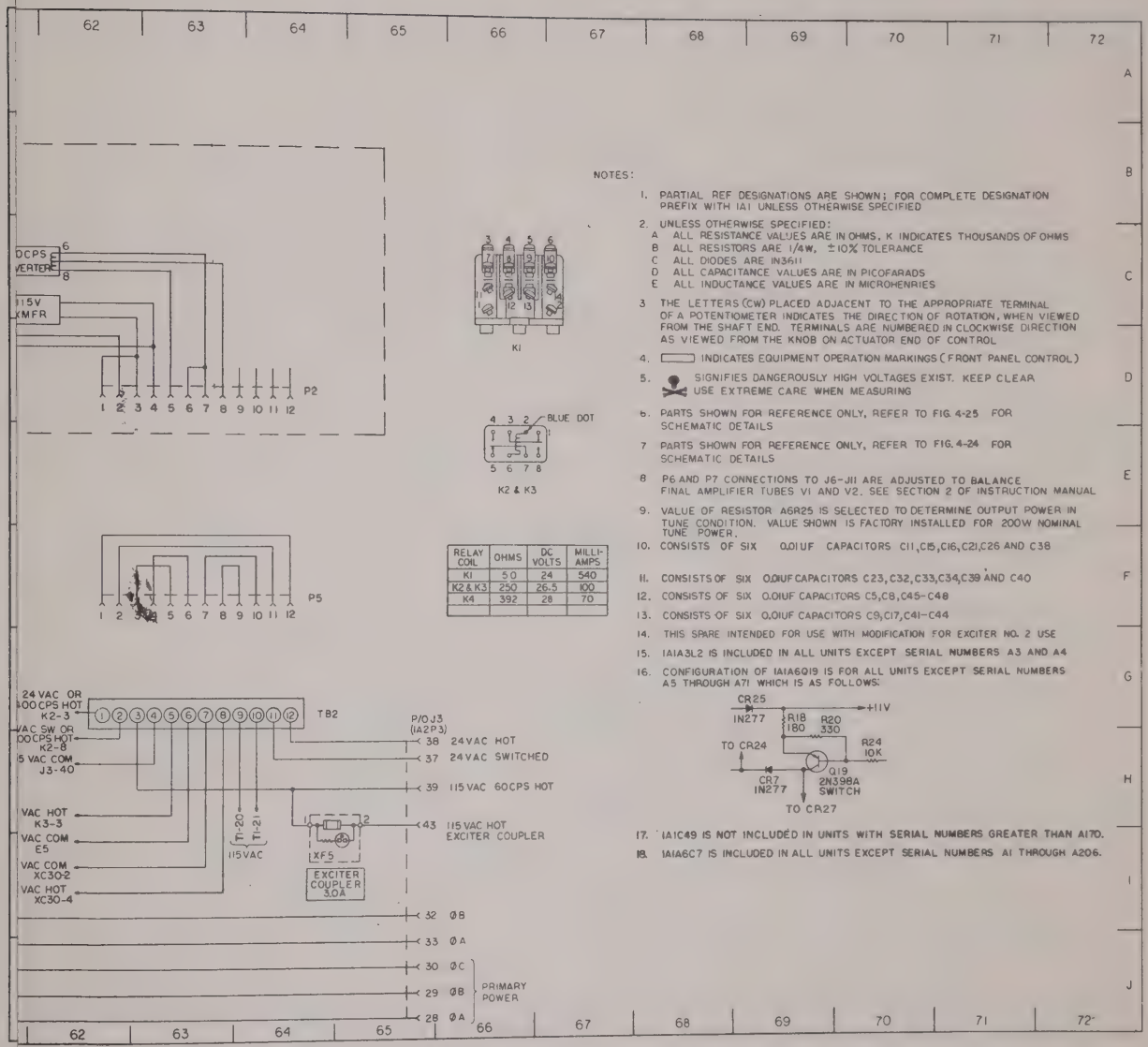


Figure 5-23. Radio Frequency Amplifier AM-3924(P)/URT Chassis, Schematic Diagram (Sheet 2 of 2)

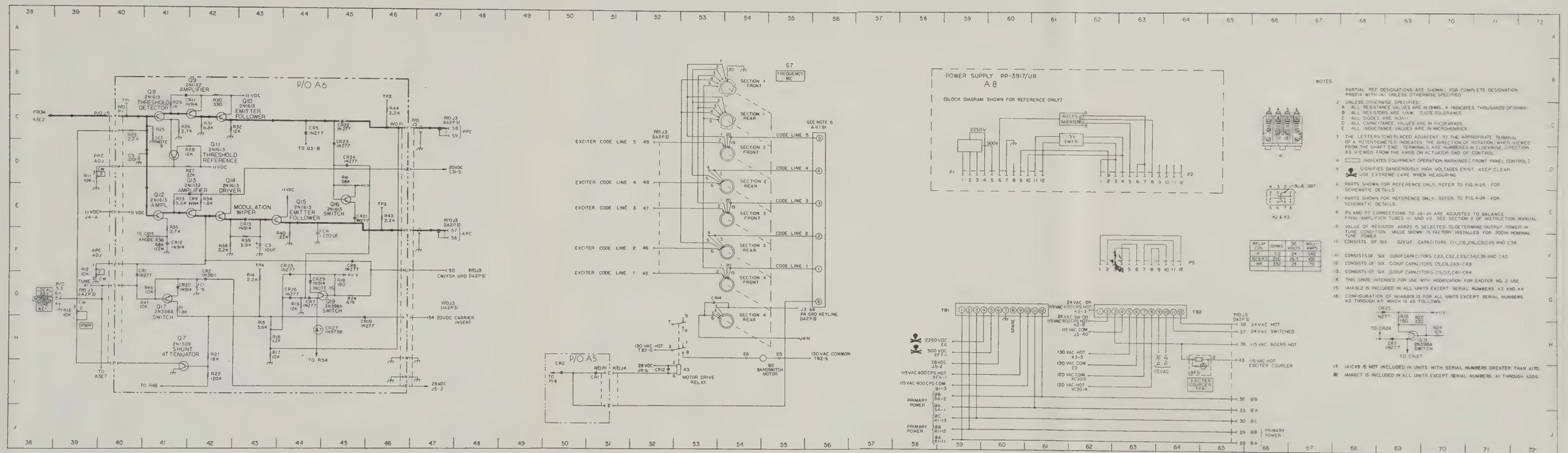


Figure 5-23. Radio Frequency Amplifier AM-3924(P)/URT Chassis, Schematic Diagram (Sheet 2 of 2)

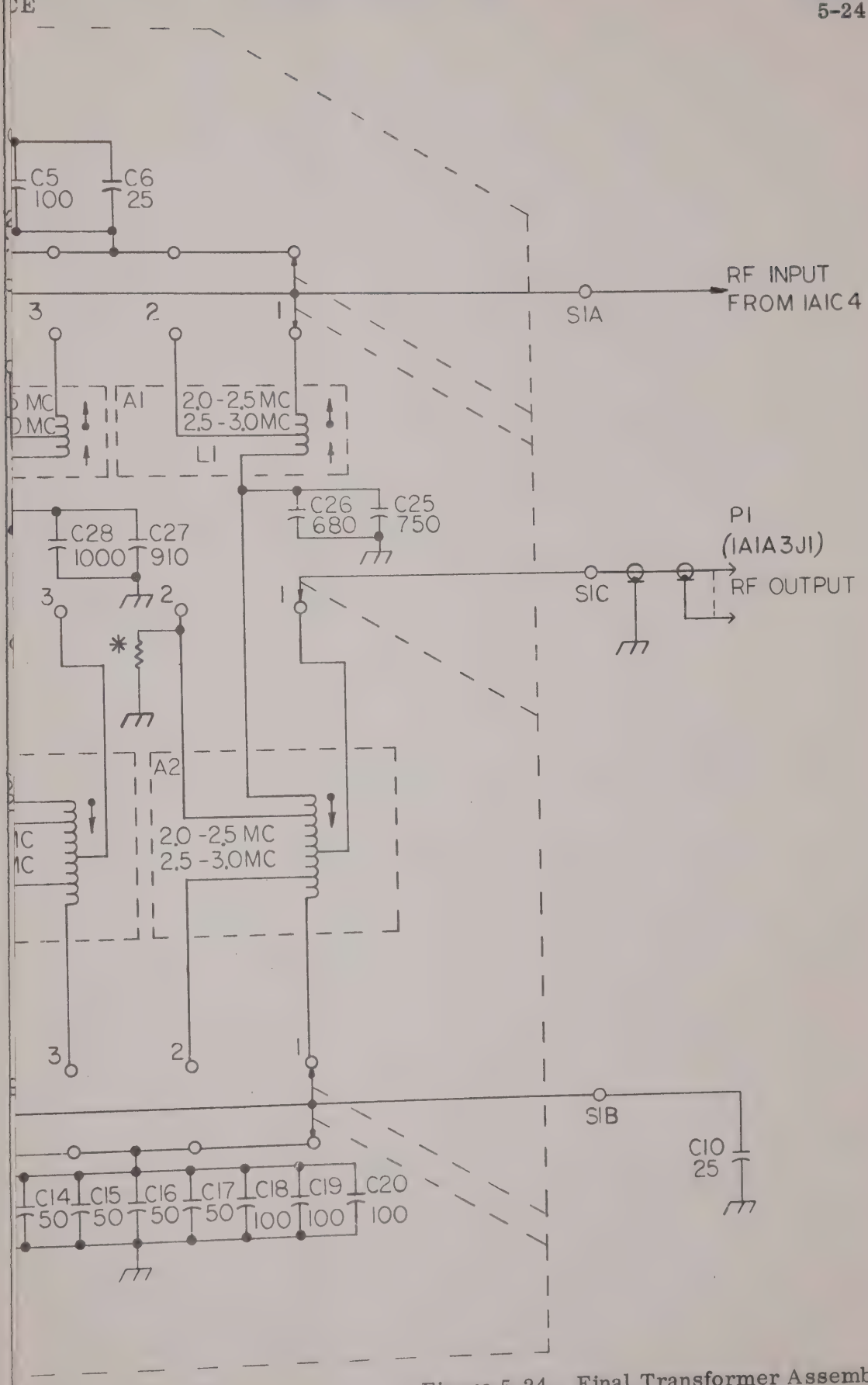


Figure 5-24. Final Transformer Assembly 1A1A2, Schematic Diagram

NOTES:
1 UNLESS OTHERWISE INDICATED ALL CAPACITORS ARE IN PICOFARADS AND RESISTORS ARE IN OHMS
2 SWITCH IS SHOWN IN 2.0-2.5 MC POSITION
3 ▮ INDICATES BLUE COLOR CODED TUNING SCREW
▮ INDICATES UNCODED SCREW
ARROWS INDICATE DIRECTION OF SLUG TRAVEL WITH CLOCKWISE ROTATION OF SCREW
4 PREFIX PARTIAL REFERENCE DESIGNATIONS WITH 1A1A2
5 * CONSISTS OF R1 THROUGH R4 IN PARALLEL, EACH 27K, 2W
** CONSISTS OF R5 THROUGH R8 IN PARALLEL, EACH 27K, 2W

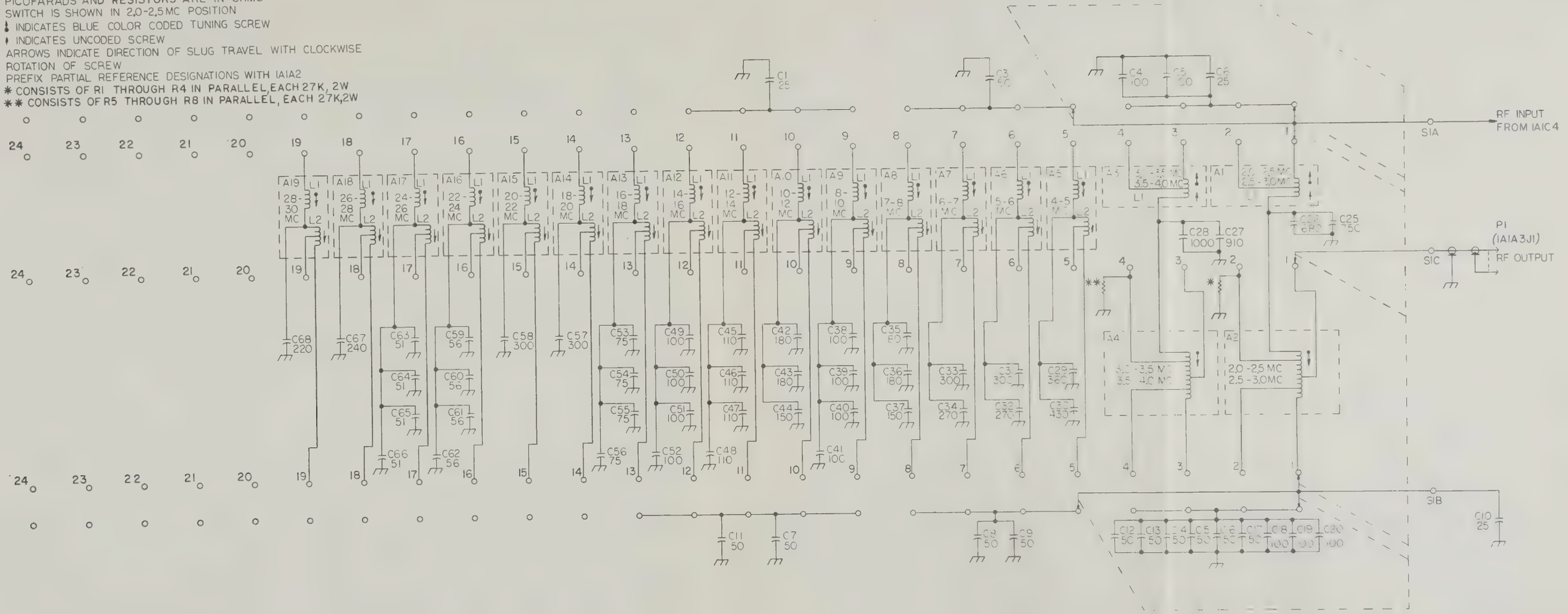


Figure 5-24. Final Transformer Assembly 1A1A2, Schematic Diagram

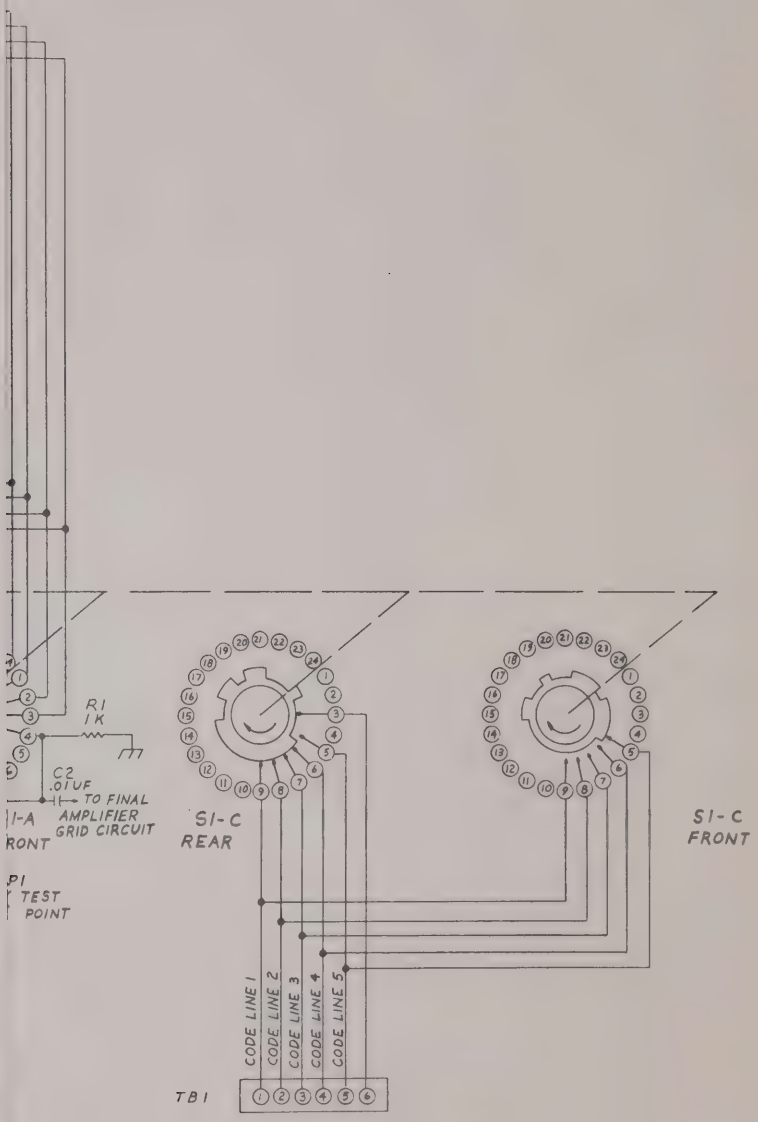
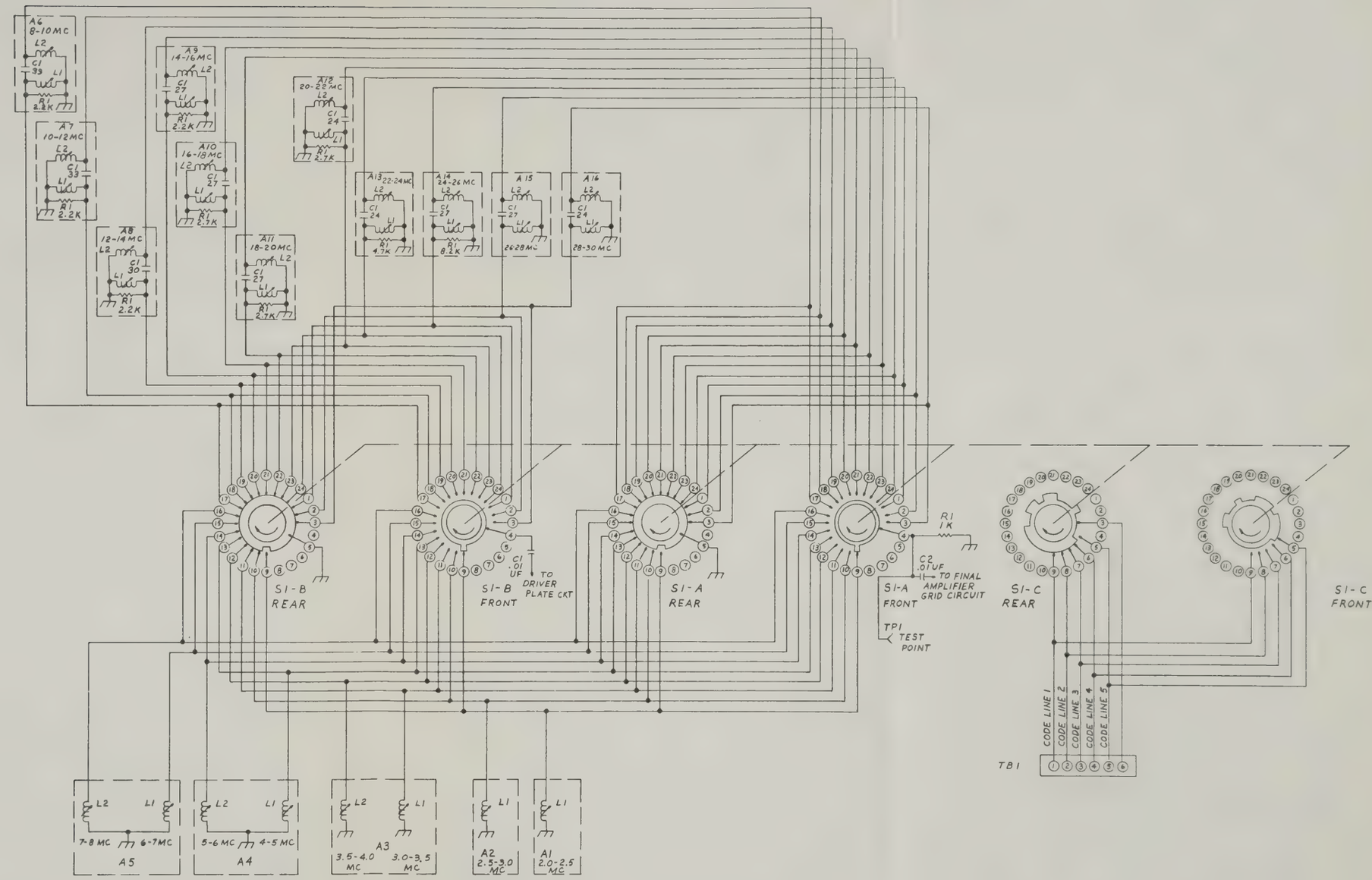


Figure 5-25. Driver Transformer Assembly 1A1A4, Schematic Diagram



NOTES:
1. UNLESS OTHERWISE INDICATED
   A. ALL CAPACITORS ARE IN PICOFARADS
   B. ALL RESISTORS ARE IN OHMS, 2W, 10% CARBON

Figure 5-25. Driver Transformer Assembly 1A1A4, Schematic Diagram

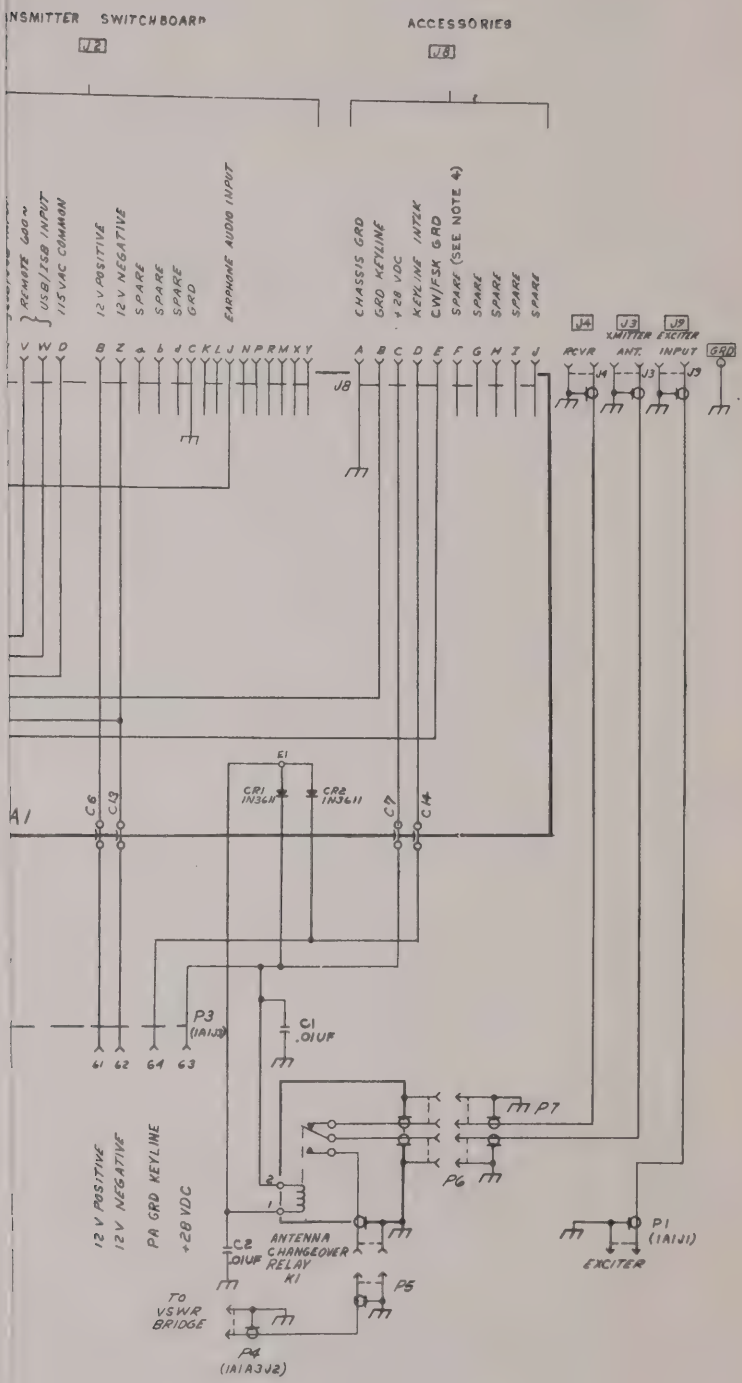
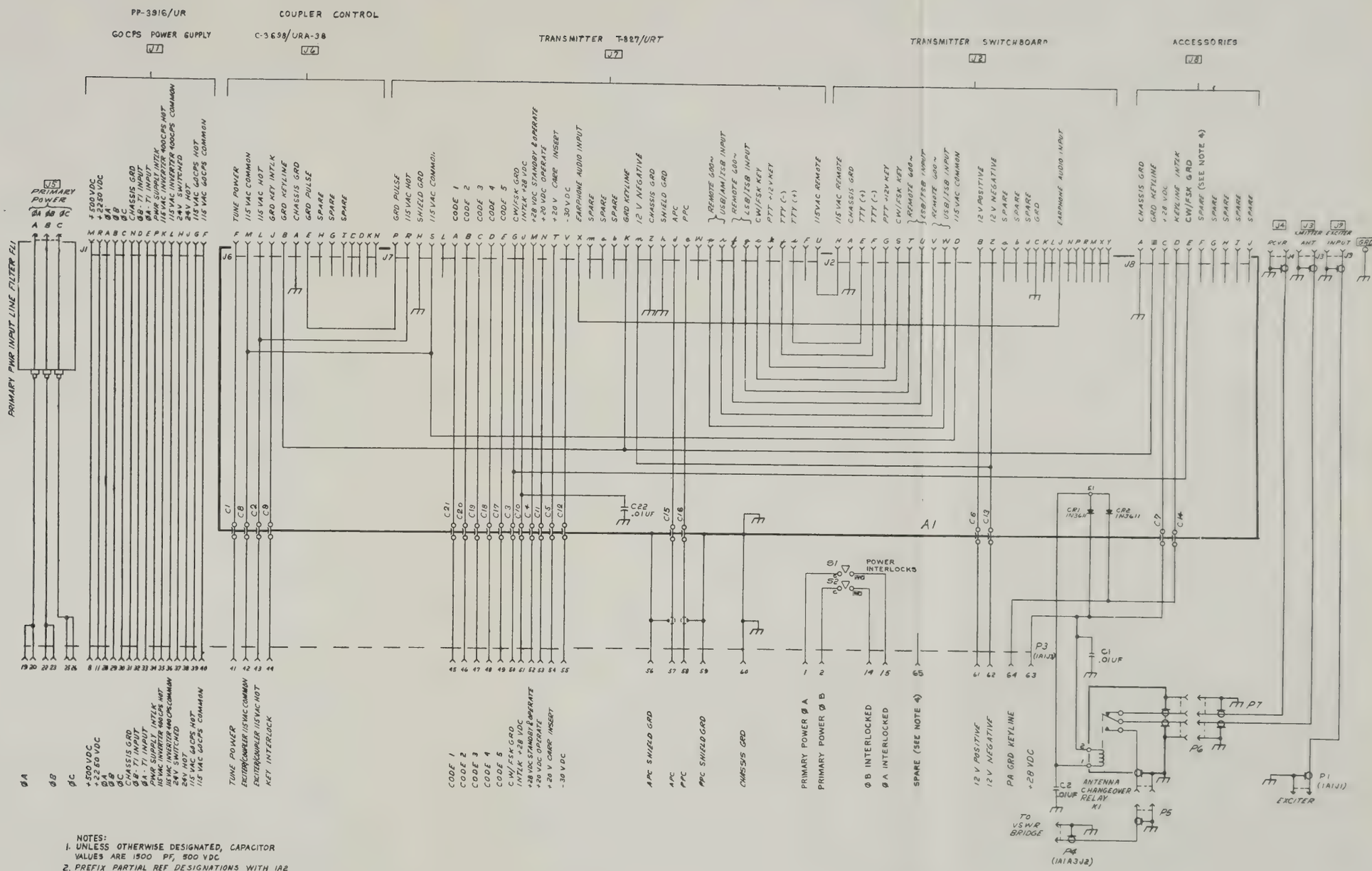


Figure 5-26. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram



NOTES:
1. UNLESS OTHERWISE DESIGNATED, CAPACITOR VALUES ARE 1500 PF, 500 VDC
2. PREFIX PARTIAL REF DESIGNATIONS WITH IA2 PLUS APPROPRIATE SUBASSEMBLY NUMBER
3. ▭ INDICATES CASE MARKING.
4. THIS SPARE INTENDED FOR USE WITH MODIFICATION KIT FOR EXTRA EXCITER (SEE TECHNICAL MANUAL)

Figure 5-26. Radio Frequency Amplifier AM-3924(P)/URT, Case, Schematic Diagram

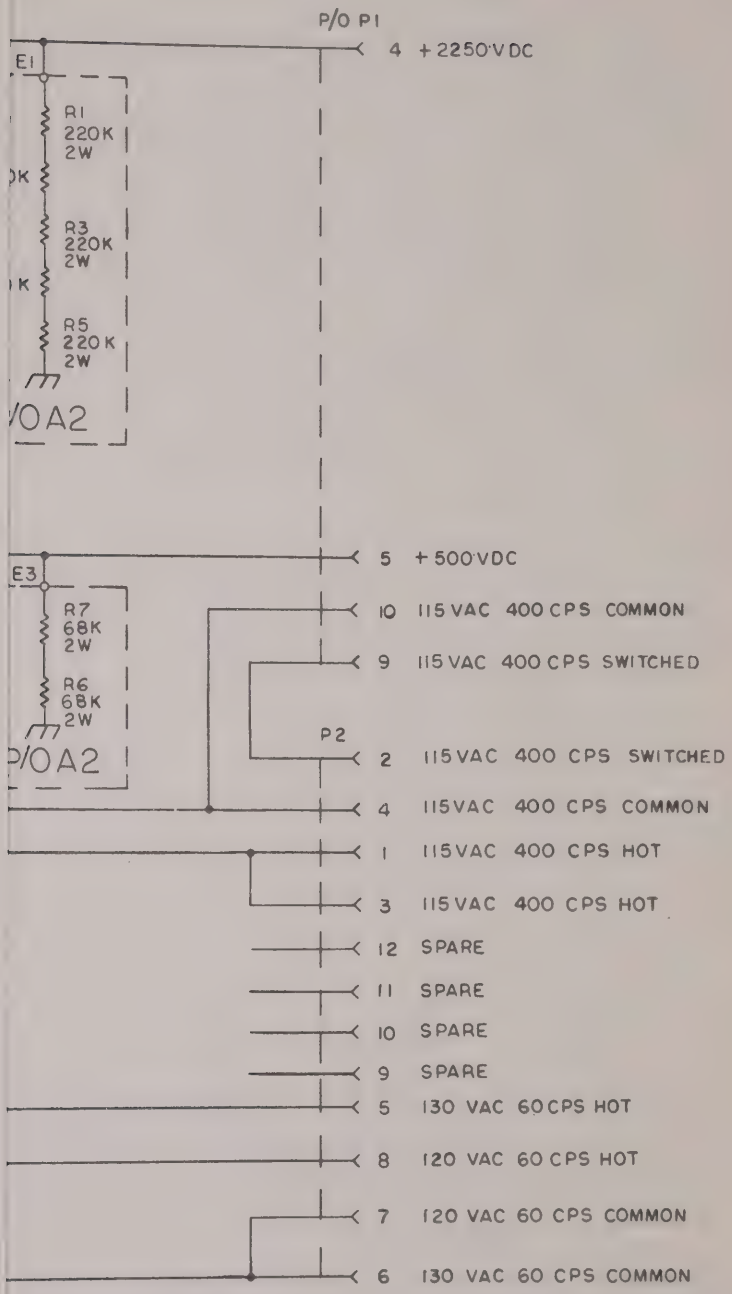


Figure 5-27. Power Supply PP-3917/UR, Schematic Diagram

NOTES:
1. UNLESS OTHERWISE INDICATED ALL RESISTORS ARE IN OHMS, 1/2W, 10%
2. CR1 AND CR2 ARE D22-5002-000
3. CR3 IS D22-5001-000

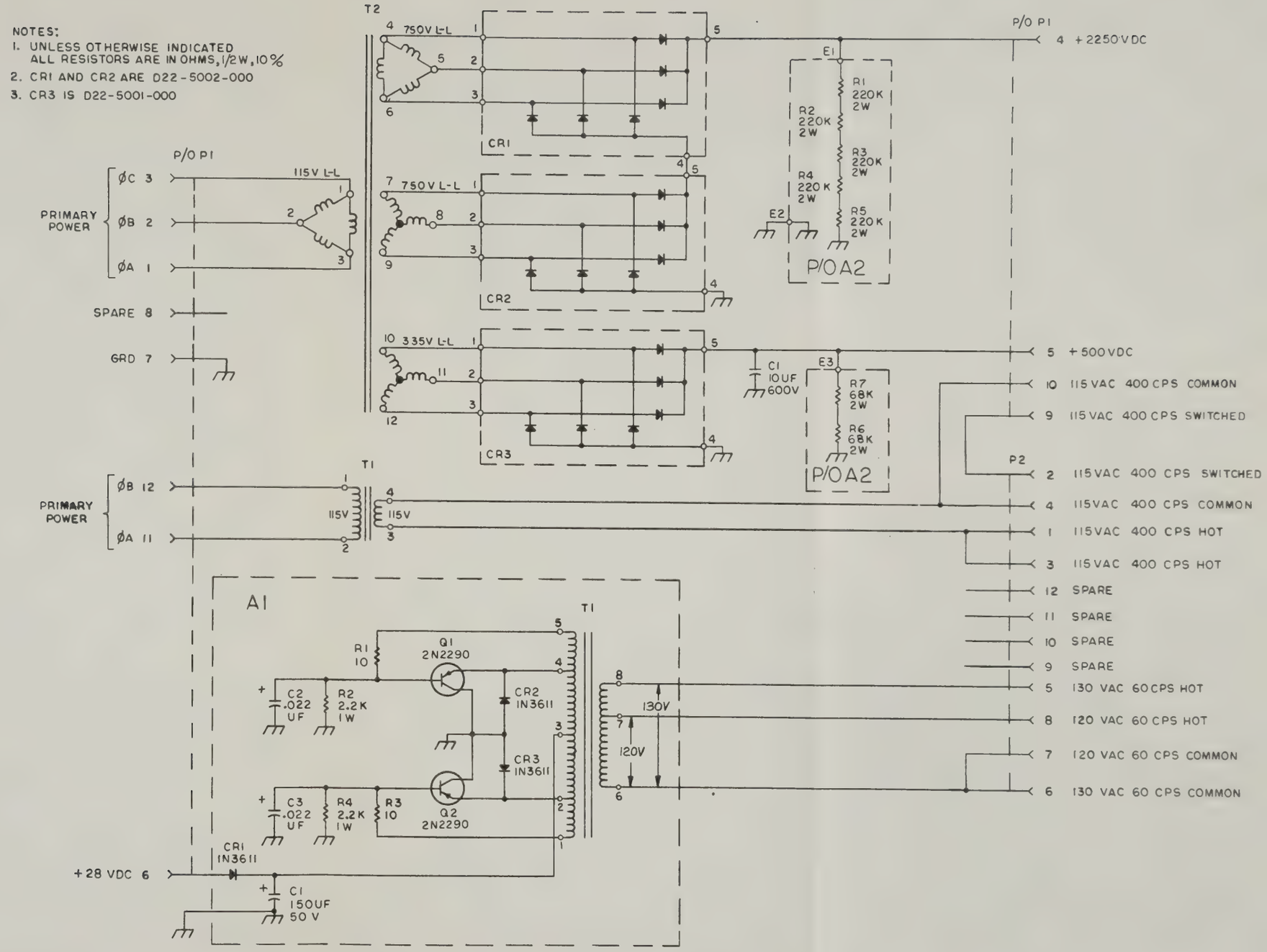


Figure 5-27. Power Supply PP-3917/UR, Schematic Diagram

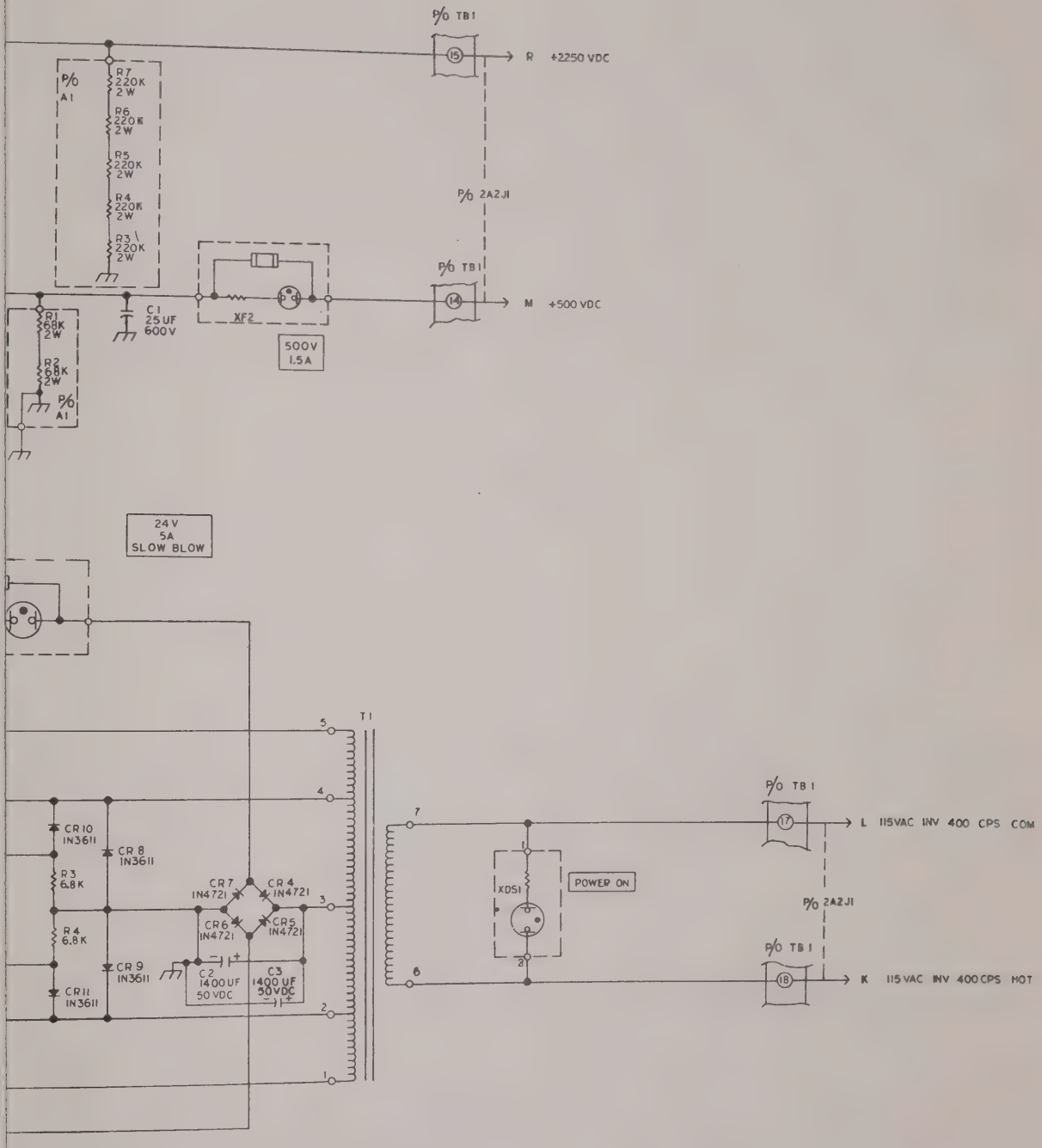


Figure 5-28. Power Supply PP-3916/UR, Schematic Diagram

NOTES:

1. UNLESS OTHERWISE INDICATED:
   A. ALL RESISTORS ARE IN OHMS, ½ W, 10 %
2. PREFIX ALL INCOMPLETE REFERENCE DESIGNATIONS WITH 2A1
3. [ ] INDICATES FRONT PANEL MARKING

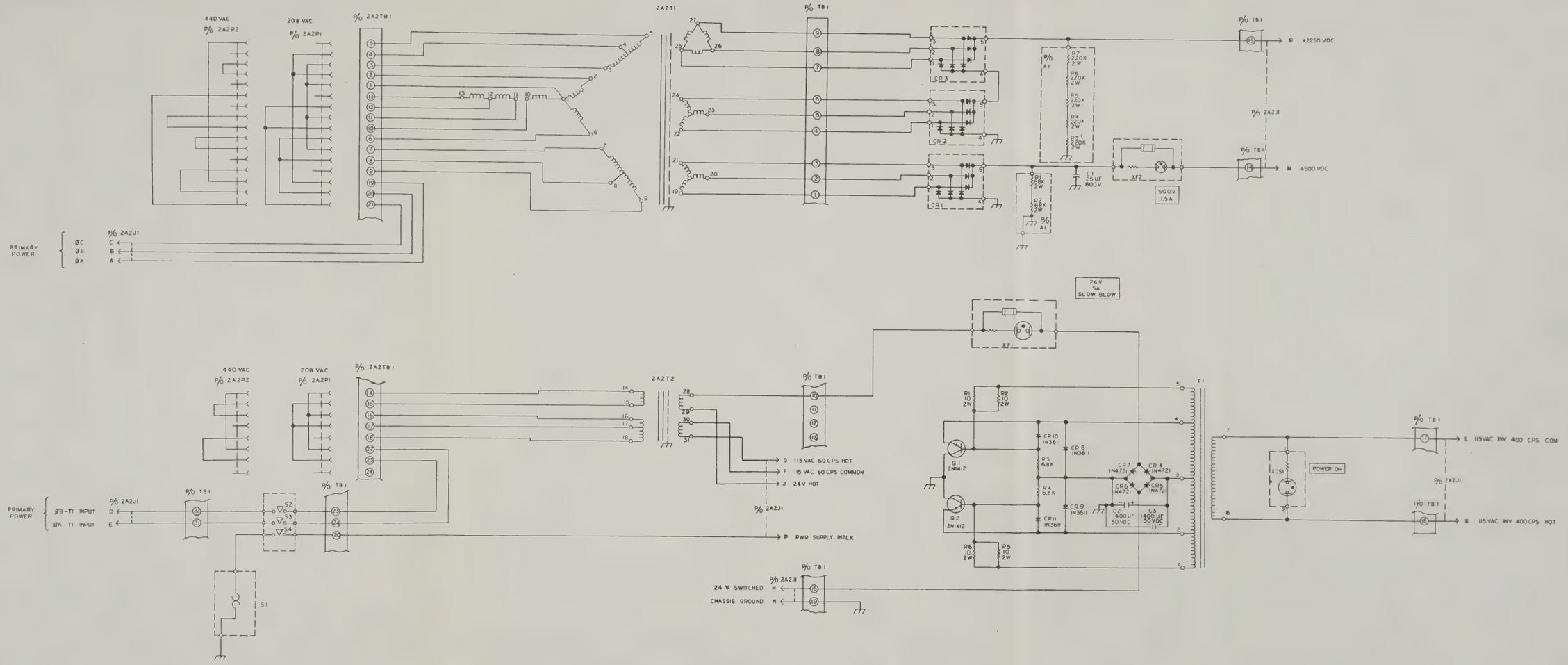


Figure 5-28. Power Supply PP-3916/UR, Schematic Diagram

SUPPLEMENTARY PARTS LIST

NOTE

This parts list has been corrected by means of the following supplementary table. For any given item, always refer first to the appropriate listing in the supplementary table, since it completely supersedes any corresponding listing in the basic table. If no information is shown for a given item, refer to the basic table for the required information.

TABLE 6-2A. MAINTENANCE PARTS LIST

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1B3		METER TIME ELAPSE: 120V, 60 CPS, 1 ø, 1000 HRS, MFR 14304, PN B31-0001-000	5-7
1A1C2		CAPACITOR, FIXED CERAMIC: 0.005 UF ± 20% 3000 VDCW, MFR 14304; PN C11-0003-001	5-7
1A1C3		SAME AS 1A1C2	5-7
1A1C4		CAPACITOR, FIXED MICA: MIL type CM60B103K03	5-7
1A1C29		CAPACITOR, FIXED ELECTROLYTIC: MIL type CE51C470K	5-7
1A1C49	14	CAPACITOR, FIXED, PAPER: 0.5 UF ± 10%, 2500 VDCW, MFR 53021, PN 702012-1603	5-9
1A1J1		CONNECTOR, COAXIAL: MIL type M23329/3-16	5-6
1A1K1		RELAY, SOLENOID: 24 VDC, 4 PDT, MFR 77342 PN PM17DY24V	5-8
1A1L2		COIL, FIXED RF: MIL type MS16221-15	5-7
1A1MP88 through 1A1MP98		SAME AS 1A1MP87	5-5
1A1Q1		TRANSISTOR: MIL type 2N297A	5-6
1A1T1		TRANSFORMER, POWER: MFR 14304, PN 391-3562	5-6
1A1TB4		TERMINAL BOARD: MIL type 37TB13	5-6
1A1XF4		FUSE HOLDER: MFR 14304, PN J50-0004-001	5-8
1A1XF5		SAME AS 1A1XF4	5-8
1A1XF6		FUSE HOLDER: MFR 14304, PN J50-0004-002	5-8
1A1XF7		SAME AS 1A1XF4	5-8

TABLE 6-2A. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A1L4 through 1A1A1L6		SAME AS 1A1L3	5-10
1A1A2C28	7	CAPACITOR, FIXED PORCELAIN: 820 PF ±5%, 500 VDCW, MFR 95275, PN VY83C821J	5-11
1A1A2C29		CAPACITOR, FIXED PORCELAIN: 330 PF ±5%, 500 VDCW, MFR 95275, PN VY82C331J	5-11
1A1A2C38	8	CAPACITOR, FIXED PORCELAIN: 75 PF ±5%, 500 VDCW, MFR 95275, PN VY81C750J	5-11
1A1A2C39	8	SAME AS 1A1A2C37	5-11
1A1A2C40		SAME AS 1A1A2C37	5-11
1A1A2C41		NOT USED	
1A1A2C42 through 1A1A2C44		SAME AS 1A1A2C35	5-11
1A1A2C46		SAME AS 1A1A2C45	5-11
1A1A2C47		SAME AS 1A1A2C45	5-11
1A1A2C48		SAME AS 1A1A2C37	5-11
1A1A2C49		CAPACITOR, FIXED PORCELAIN: 100 PF ±5%, 500 VDCW, MFR 95275, PN VY81C101J	5-11
1A1A2C50		SAME AS 1A1A2C45	5-11
1A1A2C51		SAME AS 1A1A2C45	5-11
1A1A2C52		SAME AS 1A1A2C37	5-11
1A1A2C53 through 1A1A2C56		SAME AS 1A1A2C38	5-11
1A1A2C57		CAPACITOR, FIXED PORCELAIN: 220 PF ±5%, 2500 VDCW, MFR 14304, PN C11-0004-009	5-11
1A1A2C58		CAPACITOR, FIXED PORCELAIN: 300 PF ±5%, 2500 VDCW, MFR 14304, PN C11-0004-018	5-11
1A1A2C68		CAPACITOR, FIXED PORCELAIN: 200 PF ±5%, 2500 VDCW, MFR 14304, PN C11-0004-028	5-11

TABLE 6-2A. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A2C69		SAME AS 1A1A2C57	5-11
1A1A2P1		CONNECTOR, PLUG: MIL type M23329/3-03	5-6/5-11
1A1A3J1		CONNECTOR, COAXIAL: MIL type UG-909A/U	5-12
1A1A3L2	9	COIL, FIXED RF: MIL type LT4K029	5-12
1A1A4S1		SWITCH, ROTARY: MFR 14304, PN 391-3830	5-13
1A1A5CR2		SAME AS 1A1CR1	5-14
1A1A5CR3		DIODE: MIL type lN277M	5-14
1A1A5CR4 through 1A1A5CR6		SAME AS 1A1A5CR3	5-14
1A1A5CR8		SAME AS 1A1A5CR3	5-14
1A1A5CR10 through 1A1A5CR16		SAME AS 1A1A5CR3	5-14
1A1A5R26		RESISTOR, FIXED COMPOSITION: MIL type RC20GF471K	5-14
1A1A5R27		RESISTOR, FIXED COMPOSITION: MIL type RC07GF121K	5-14
1A1A5R36		SAME AS 1A1A5R35	5-14
1A1A6C6		CAPACITOR, FIXED ELECTROLYTIC: MIL type CS13BF685K	5-15
1A1A6C7	13	SAME AS 1A3C3	5-15
1A1A6CR1		SAME AS 1A1A5CR3	5-15
1A1A6CR5		SAME AS 1A1A5CR3	5-15
1A1A6CR7		SAME AS 1A1A5CR3	5-15
1A1A6CR8		SAME AS 1A1A5CR3	5-15
1A1A6CR19		SAME AS 1A1A5CR3	5-15
1A1A6CR21 through 1A1A6CR26		SAME AS 1A1A5CR3	5-15
1A1A6CR27		DIODE: MIL type 1N975B	5-15

TABLE 6-2A. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A6CR28		SAME AS 1A1A5CR3	5-15
1A1A6CR29	10	SAME AS 1A1CR13	5-15
1A1A6MP1		APC-PPC PCB: MFR 14304, PN 391-3342	5-15
1A1A6R18	11	SAME AS 1A1A5R16	5-15
1A1A6R20	12	NOT USED	
1A1A6R23		SAME AS 1A1A5R29	5-15
1A1A6R24		SAME AS 1A1A5R3	5-15
1A1A6R38		SAME AS 1A1A5R12	5-15
1A1A6R46		SAME AS 1A1A5R9	5-15
1A1A6R54		SAME AS 1A1A5R29	5-15
1A2J5 through 1A2J8		NOT USED	
1A2P1		CONNECTOR, COAXIAL: MIL type M23329/3-02	5-17
1A2P4 through 1A2P6		SAME AS 1A1A2P1	5-17
1A2P7		CONNECTOR, COAXIAL: MIL type UG-88E/U	5-17
1A1A8A1Q1		TRANSISTOR: MFR 04713, PN 2N2290	5-19
1A1A8A1R1		RESISTOR, FIXED COMPOSITION: MIL type RC20GF560K	5-19
2A1F2		SAME AS 1A1F7	5-20
4	4	BASE, SHOCK MOUNT, ELECTRICAL EQUIPMENT, MT-3399/U: MFR 14304, PN 391-0900	1-2

NOTES: The following notes are supplementary to basic notes 1 through 6.

NOTE 7. Value and PN shown for 1A1A2C28 is for all units except serial numbers A3 through A145 in which it is a 1000 PF ±5%, 500 VDCW, PN VY83C102J.

NOTE 8. Values and PN's shown for 1A1A2C38 and 1A1A2C39 are for all units except serial numbers A5, A6, A8, A9, A10, A13 in which they are a 110 PF ±5%, 500 VDCW, VY81C111J.

NOTE 9. Inductor 1A1A3L2 is used in all units except serial numbers A3 and A4.

NOTE 10. Diode 1A1A6CR29 is used in all units except serial numbers A5 through A71.

NOTE 11. PN shown for 1A1A6R18 is for all units except serial numbers A5 through A71 in which it is an RC07GF181K.

NOTE 12. Resistor 1A1A6R20 is deleted for all units except A5 through A71 in which it is an RC07GF103K.

NOTE 13. Capacitor 1A1A6C7 is not used in units with serial numbers A1 through A206.

NOTE 14. Capacitor 1A1C49 is not used in units with serial numbers greater than A170.

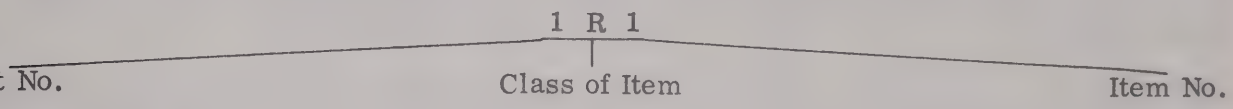
SECTION 6

PARTS LIST

6-1. REFERENCE DESIGNATIONS.

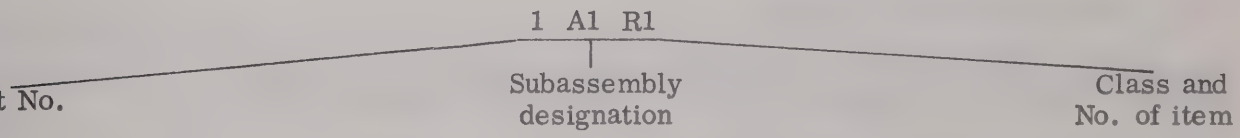
6-2. The unit numbering method of assigning reference designations has been used to identify units, assemblies, subassemblies, and parts. This method has been expanded as much as necessary to adequately cover the various degrees of subdivision of the equipment. Examples of this unit numbering method and typical expansions of the same are illustrated by the following:

Example 1:



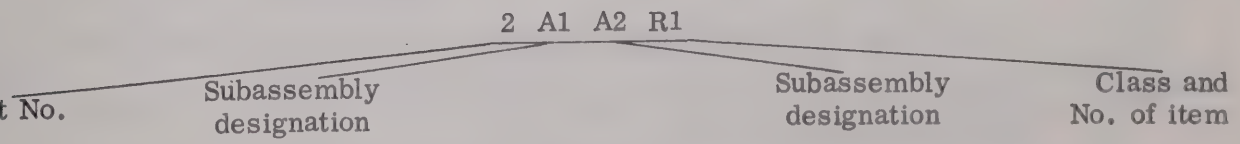
Read as: First (1) resistor (R) of first unit (1).

Example 2:



Read as: First (1) resistor (R) of first (1) subassembly (A) of first (1) unit.

Example 3:



Read as: First (1) resistor (R) of second (2) subassembly (A) of first (1) subassembly (A) of second (2) unit.

6-3. REFERENCE DESIGNATION PREFIX.

6-4. Partial reference designations are used on the equipment and illustrations. The partial reference designations consist of the class letter(s) and the identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Prefixes are provided on illustrations following the notation "REF DESIG PREFIX".

6-5. LIST OF UNITS.

6-6. Table 6-1 is a listing of the units comprising the equipment. The units are listed by unit numbers in numerical order. Thus when the complete reference designation of a part is known, this table will furnish the identification of the unit in which the part is located, since the first number of a complete reference designation identifies the unit. Table 6-1 also provides the following information for each unit listed: (1) quantity per equipment, (2) official name, (3) designation, (4) colloquial name, and (5) location of the first page of its parts listing in table 6-2.

6-7. MAINTENANCE PARTS LIST.

6-8. Table 6-2 lists all units and their maintenance parts. The units are listed in numerical sequence. Maintenance parts for each unit are listed alphabetically-numerically by class of part following the unit designation. Thus the parts for each unit are grouped together. Table 6-2 provides the following information: (1) the complete reference designation of each unit, assembly, subassembly, or part, (2) reference to explanatory notes in paragraph 6-6, (3) noun name and brief description, and (4) identification of the illustration which locates the part.

6-9. Printed circuit boards, assembly boards modules, etc., are listed first as individual items in the maintenance parts list. In addition, at the completion of a parts listing for each unit, the individual circuit board, assembly board, module, etc., is then broken down by components into separate parts listings. When there is a redundancy of such electronic assemblies in subsequent units, reference is made to the parts breakdown previously listed.

6-10. LIST OF MANUFACTURERS.

6-11. Table 6-3 lists the manufacturers of parts used in the equipment. The table includes the manufacturer's code used in table 6-2 to identify the manufacturers.

6-12. NOTES.

6-13. The following notes provide information as referenced in table 6-2.

NOTE 1. Power Supply PP-3917/UR used only when primary power is 400 CPS.

NOTE 2. Power Supply PP-3916/UR used only when primary power is 60 CPS.

NOTE 3. Maintenance Parts List for Radio Transmitter T-827/URT is listed in NAVSHIPS 0967-032-0010.

NOTE 4. Base, Shock Mount, Electrical Equipment MT-3399/U is not used when AN/URT-23(V) is rack mounted.

NOTE 5. Not supplied as part of the AN/URT-23(V).

NOTE 6. Selected for desired tune power at the time of installation.

TABLE 6-1. LIST OF UNITS

UNIT NO.	QTY	NOTE	NAME OF UNIT	DESIGNATION	COLLOQUIAL NAME	PAGE
1	1		Radio Frequency Amplifier	AM-3924(P)/URT	Power Amplifier	6-4
1A1A8		1	Power Supply	PP-3917/UR	Power Supply	6-30
2	1	2	Power Supply	PP-3916/UR	Power Supply	6-31
3	1	3	Radio Transmitter	T-827/URT	Exciter	6-33
4	1	4	Base, Shock Mount, Electrical Equipment	MT-3399/U	Shock Mount	6-33
-	-		Ancillary items	-	-	6-33

TABLE 6-2. MAINTENANCE PARTS LIST

AMPLIFIER, RADIO FREQUENCY AM-3924(P)/URT

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1		AMPLIFIER, RADIO FREQUENCY AM-3924(P)/URT: MFR 14304, PN 391-1000	5-7
1A1		CHASSIS-PANEL ASSEMBLY: MFR 14304 PN 391-3100	5-7
1A1B1		FAN: 115V, 400 CPS, 1 ϕ, MFR 14304, PN B22-0001-000	5-8
1A1B2		MOTOR, SYNCHRONOUS: 115 V, 60 CPS, 1 ϕ, 6 RPM, MFR 14304, PN B11-0004-000	5-8
1A1B3		METER TIME ELAPSE: 120 V, 60 CPS, 1 ϕ, 1000 HRS, MFR 14304, PN B31-0001-000	5-8
1A1C1		CAPACITOR, FIXED PAPER: MIL type CP53B1EF205K1	5-8
1A1C2		CAPACITOR, FIXED CERAMIC: 0.005 UF $\pm$ 20%, 3000VDCW, MFR 14304, PN C11-0003-001	5-8
1A1C3		SAME AS 1A1C2	5-8

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1C4		CAPACITOR, FIXED MICA: MIL type CM60B103K	5-8
1A1C5		CAPACITOR, FIXED CERAMIC: MIL type CK63AY103X	5-9
1A1C6 through 1A1C13		SAME AS 1A1C5	5-9
1A1C14		NOT USED	
1A1C15 through 1A1C17		SAME AS 1A1C5	5-9
1A1C18		NOT USED	
1A1C19 through 1A1C21		SAME AS 1A1C5	5-9
1A1C22		NOT USED	
1A1C23		SAME AS 1A1C5	5-9
1A1C24		SAME AS 1A1C5	5-9
1A1C25		NOT USED	5-9
1A1C26 through 1A1C28		SAME AS 1A1C5	5-9
1A1C29		CAPACITOR, FIXED ELECTROLYTIC: MIL type CE5C1470K	5-7
1A1C30		CAPACITOR, FIXED ELECTROLYTIC: MIL type CE51C401F	5-7
1A1C31		CAPACITOR, FIXED ELECTROLYTIC: MIL type CE51C251F	5-7
1A1C32 through 1A1C34		SAME AS 1A1C5	5-9
1A1C35		CAPACITOR, FIXED CERAMIC: 3PF NPO ±5%, 5000 VDCW, MFR 71590, PN 855-3Z	5-7

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1C36		CAPACITOR, FIXED MICA: MIL type CM06D751J03	5-7
1A1C37 through 1A1C48		SAME AS 1A1C5	5-7 5-9
1A1C49		CAPACITOR, FIXED PAPER: 0.5 UF ±10%, 2500 VDCW, MFR 53021, PN 702012-1603	5-9
1A1CR1		DIODE: MIL type 1N3611	5-8
1A1CR2		SAME AS 1A1CR1	5-6
1A1CR3		DIODE: MIL type 1N3000B	5-6
1A1CR4		DIODE: MIL type 1N3002B	5-6
1A1CR5		SAME AS 1A1CR4	5-6
1A1CR6		SAME AS 1A1CR4	5-6
1A1CR7		DIODE: MIL type 1N753A	5-6
1A1CR8 through 1A1CR11		SAME AS 1A1CR7	5-6
1A1CR12		SAME AS 1A1CR1	5-6
1A1CR13		DIODE: MIL type 1N914	5-7
1A1CR14		SAME AS 1A1CR1	5-7
1A1DS1		ALARM, SONALERT: 6-28 VDC, 3-14 MA, SOUND 68-80 DB, 2.5 KC, MFR 18787, PN SC-628	5-7
1A1DS2		LAMP, NEON: MIL type MS25252NE2D	5-7
1A1DS3		SAME AS 1A1DS2	5-7
1A1DS4		NOT USED	5-7
1A1DS5		LAMP, INCANDESCENT: MIL type MS25237-327T	5-7
1A1F1		FUSE, CARTRIDGE: MIL type F60-6A	5-8
1A1F2		SAME AS 1A1F1	5-8

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1F3		SAME AS 1A1F1	5-8
1A1F4		FUSE, CARTRIDGE: MIL type F02A-1A	5-8
1A1F5		FUSE, CARTRIDGE: MIL type F02A-3A	5-8
1A1F6		SAME AS 1A1F5	5-8
1A1F7		FUSE, CARTRIDGE: MIL type F02A-1.5A	5-8
1A1H1		NUT, HEX, LARGE PATTERN, (PART OF 1A1XV1/XV2): No. 4-40 UNC-2B, MFR 14304, PN J30-0002-003	5-5
1A1H2 through 1A1H12		SAME AS 1A1H1	5-5
1A1H13		SCREW, MACHINE, BINDING HEAD, CROSS RECESSED (PART OF 1A1XV1/XV2): NO. 4-40 UNC-2A, 1.75 IN. LONG, MFR 14304, PN J30-0002-006	5-5
1A1H14 through 1A1H24		SAME AS 1A1H13	5-5
1A1H25		LOCKWASHER, SPLIT, LIGHT SERIES, NO. 4 (PART OF 1A1XV1/XV2): MFR 14304, PN J30-0002-007	5-5
1A1H26 through 1A1H36		SAME AS 1A1H25	5-5
1A1H37		WASHER, FLAT, FIBER (PART OF 1A1XV1/XV2: .03 THICK X .31 OD X .12 ID, MFR 14304, PN J30-0002-009	5-5
1A1H38 through 1A1H48		SAME AS 1A1H37	5-5
1A1H49		WASHER, PLAIN, NICKEL PLATED BRASS (PART OF 1A1XV1/XV2): .03 THICK X .31 OD X .12 ID, MFR 14304, PN J30-0002-010	5-5
1A1H50 through 1A1H60		SAME AS 1A1H49	5-5

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1J1		CONNECTOR, RECEPTACLE: MIL type UG-909A/U	5-6
1A1J2		NOT USED	
1A1J3		CONNECTOR, RECEPTACLE: 66 PIN, RECTANGULAR, MFR 14304, PN J10-0001-000	5-6
1A1J4		CONNECTOR, RECEPTACLE: 36 PIN, MFR 02660, PN 143-036-01-107	5-7
1A1J5		SAME AS 1A1J4	5-7
1A1J6		CONNECTOR, RECEPTACLE: 1 PIN, MFR 98291, PN SKT-10-RED	5-6
1A1J7 through 1A1J11		SAME AS 1A1J6	5-6
1A1K1		RELAY, SOLENOID: 24 VDC, 4PDT, MFR 77342, PN PM17A24V	5-8
1A1K2		RELAY, SOLENOID: MIL type M5757/23-001	5-6
1A1K3		SAME AS 1A1K2	5-6
1A1K4		RELAY, TIME DELAY: MIL type M19648/1-021	5-6
1A1L1		COIL, FIXED RF: MFR 14304, PN 391-3307	5-7
1A1L2		COIL, FIXED RF: MIL type M516221-15	5-7
1A1L3		COIL, FIXED RF: MIL type LT4K068	5-9
1A1L4		SAME AS 1A1L3	5-9
1A1L5		SAME AS 1A1L3	5-9
1A1L6		COIL, FIXED RF: MFR 14304, PN 391-3311	5-7
1A1M1		METER, PANEL: MFR 14304, PN 391-3677	5-7
1A1M2		METER, PANEL: MFR 14304, PN 391-3676	5-7
1A1MP1		SPACER, CERAMIC (PART OF 1A1XV1/XV2): MFR 14304, PN J30-0002-001	5-5

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1MP2 through 1A1MP24		SAME AS 1A1MP1	5-5
1A1MP25		BUSHING, CERAMIC (PART OF 1A1XV1/XV2): MFR 14304, PN J30-0002-002	5-5
1A1MP26 through 1A1MP36		SAME AS 1A1MP25	5-5
1A1MP37		SPACER, SILVER PLATE (PART OF 1A1XV1/XV2): MFR 14304, PN J30-0002-004	5-5
1A1MP38 through 1A1MP44		SAME AS 1A1MP37	5-5
1A1MP45		MOUNTING BASE (PART OF 1A1XV1/XV2): MFR 14304, PN J30-0002-005	5-5
1A1MP46		SAME AS 1A1MP45	5-5
1A1MP47		CONTACT FINGERS (PART OF 1A1XV1/XV2): MFR 14304, PN J30-0002-008	5-5
1A1MP48 through 1A1MP78		SAME AS 1A1MP47	5-5
1A1MP79		CONNECTOR, BEAD CHAIN: MFR 89606, PN 6-DB-SS	5-8
1A1MP80		BEAD CHAIN: MFR 89606, PN 6-SS	5-8
1A1MP81		KNOB: MIL type MS91528-1D2B	5-7
1A1MP82		SAME AS 1A1MP81	5-7
1A1MP83		KNOB: MIL type MS91528-1P2B	5-7
1A1MP84		SAME AS 1A1MP83	5-7
1A1MP85		KNOB: MIL type MS91528-3F2B	5-7
1A1MP86		TRANSMISSION ASSY: MFR 14304, PN 391-3250	5-6
1A1MP87		SPACER: MFR 14304, PN 391-3488	5-5

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1MP88 through 1A1MP97		SAME AS 1A1MP87	5-5
1A1P1	5	PLUG, 115V JUMPER: MFR 14304, PN 391-4000	5-7
1A1P2	5	PLUG, 208V JUMPER: MFR 14304, PN 391-4050	5-7
1A1P3		PLUG, 440V JUMPER: MFR 14304, PN 391-4100	5-7
1A1P4		NOT USED	
1A1P5		PLUG, 60 CPS JUMPER: MFR 14304, PN 391-3603	5-8
1A1P6		CONNECTOR, PLUG: MFR 98291, PN PR300 BROWN	5-6
1A1P7		CONNECTOR, PLUG: MFR 98291, PN PR300 RED	5-6
1A1Q1		TRANSISTOR: MIL type 2N297A	5-7
1A1R1		NOT USED	
1A1R2		NOT USED	
1A1R3		RESISTOR, FIXED FILM: MIL type RL20S512G	5-9
1A1R4		SAME AS 1A1R3	5-9
1A1R5		RESISTOR, FIXED COMPOSITION: MIL type RC42GF222K	5-9
1A1R6		RESISTOR, FIXED COMPOSITION: MIL type RC42GF182K	5-9
1A1R7		RESISTOR, FIXED COMPOSITION: MIL type RC20GF471J	5-9
1A1R8		SAME AS 1A1R7	5-9
1A1R9		RESISTOR, VARIABLE WIREWOUND: MIL type RA20LASB103A	5-6
1A1R10		RESISTOR, VARIABLE WIREWOUND: MIL type RA20NASD103A	5-8
1A1R11		SAME AS 1A1R9	5-6
1A1R12		SAME AS 1A1R9	5-6
1A1R13		SAME AS 1A1R10	5-8

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1R14		SAME AS 1A1R9	5-6
1A1R15		NOT USED	
1A1R16		RESISTOR, FIXED COMPOSITION: 2.2 OHMS ±5%, 1/2 WATT, MFR 14304, PN R11-0001-001	5-9
1A1R17 through 1A1R19		SAME AS 1A1R16	5-9
1A1R20		RESISTOR, FIXED COMPOSITION: MIL type RC20GF472J	5-7
1A1R21		RESISTOR, FIXED COMPOSITION: MIL type RC42GF330K	5-7
1A1R22		NOT USED	
1A1R23		NOT USED	
1A1R24		RESISTOR, FIXED COMPOSITION: MIL type RC42GF150K	5-9
1A1R25		RESISTOR, FIXED FILM: MIL type RL42S100G	5-9
1A1R26 through 1A1R28		SAME AS 1A1R25	5-9
1A1S1		SWITCH, AIR VANE: SPST, NO., MFR 14304, PN S95-0001-000	5-8
1A1S2		NOT USED	5-8
1A1S3		SWITCH, TOGGLE: MIL type MS35059-31	5-8
1A1S4		SWITCH, TOGGLE: MIL type MS25100-22	5-8
1A1S5		SWITCH, ROTARY: MFR 14304, PN 391-3673	5-6
1A1S6		SAME AS 1A1S3	5-7
1A1S7		SWITCH, ROTARY: MFR 14304, PN 391-3660	5-7
1A1S8		SWITCH, ROTARY: MFR 14304, PN 391-3672	5-7
1A1S9		SWITCH, INTERLOCK: MIL type MS16106-4	5-7

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1T1		TRANSFORMER, POWER: MFR 14304, PN 391-3562	5-7
1A1TB1		TERMINAL BOARD: MIL type 37TB12	5-8
1A1TB2		SAME AS 1A1TB1	5-8
1A1TB3		NOT USED	
1A1TB4		TERMINAL BOARD: MIL type 37TB13	5-7
1A1V1		TUBE, ELECTRON: MFR 08594, PN 4CX1500B/8660	5-7
1A1V2		SAME AS 1A1V1	5-7
1A1XC1 through 1A1XC28		NOT USED	
1A1XC29		SOCKET, OCTAL: MIL type TS101P02	5-7
1A1XC30		SAME AS 1A1XC29	5-7
1A1XC31		SAME AS 1A1XC29	5-7
1A1XDS1		NOT USED	
1A1XDS2		LAMPHOLDER: MIL type LH74LC13CN	5-7
1A1XDS3		SAME AS 1A1XDS2	5-7
1A1XDS4		NOT USED	
1A1XDS5		LAMPHOLDER: MIL type LH73LC12RT	5-7
1A1XF1		FUSE HOLDER: MIL type FHL12U	5-8
1A1XF2		SAME AS 1A1XF1	5-8
1A1XF3		SAME AS 1A1XF1	5-8
1A1XF4		FUSE HOLDER: MFR 14304, PN J50-0004-001	5-7
1A1XF5		SAME AS 1A1XF4	5-7
1A1XF6		FUSE HOLDER: MFR 14304, PN J50-0004-002	5-7
1A1XF7		SAME AS 1A1XF4	5-7

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A1		DRIVER TUBE ASSEMBLY: MFR 14304, PN 391-3850	5-10
1A1A1C1 through 1A1A1C14		SAME AS 1A1C5	5-10
1A1A1C15		NOT USED	
1A1A1C16		NOT USED	
1A1A1C17		CAPACITOR, FIXED MICA: MIL type CM05D391J03	5-10
1A1A1C18		SAME AS 1A1A1C17	5-10
1A1A1C19		SAME AS 1A1C5	5-10
1A1A1CR1		SAME AS 1A1CR13	5-10
1A1A1CR2		SAME AS 1A1CR13	5-10
1A1A1L1		COIL, FIXED RF: MFR 14304, PN 391-3860	5-10
1A1A1L2		COIL, FIXED RF: MIL TYPE LT4K028	5-10
1A1A1L3		COIL, FIXED RF: MIL type LT4K005	5-10
1A1A1L4 through 1A1A1L6		SAME AS 1A1L2	5-10
1A1A1R1		SAME AS 1A1R25	5-10
1A1A1R2		SAME AS 1A1R25	5-10
1A1A1R3		RESISTOR, FIXED FILM: MIL type RL20S103G	5-10
1A1A1R4		SAME AS 1A1A1R3	5-10
1A1A1R5		NOT USED	5-10
1A1A1R6		RESISTOR, FIXED COMPOSITION: MIL type RC20GF560K	5-10
1A1A1R7		RESISTOR, FIXED COMPOSITION: MIL type RC20GF103K	5-10
1A1A1TB1		TERMINAL BOARD: 13 TERMINAL, MFR 75382, PN 411-1904-13	5-10
1A1A1V1		TUBE, ELECTRON: MFR 79089, PN 8122	5-10

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A1V2		SAME AS 1A1A1V1	5-10
1A1A1XV1		TUBE SOCKET: 11 PIN, MFR 74970, PN 124-311-100	5-10
1A1A1XV2		SAME AS 1A1A1XV1	5-10
1A1A2		FINAL TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3700	5-11
1A1A2A1		2-3 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3711	5-11
1A1A2A2		2-3 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3712	5-11
1A1A2A3		3-4 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3713	5-11
1A1A2A4		3-4 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3714	5-11
1A1A2A5		4-5 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3715	5-11
1A1A2A6		5-6 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3716	5-11
1A1A2A7		6-7 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3717	5-11
1A1A2A8		7-8 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3718	5-11
1A1A2A9		8-10 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3719	5-11
1A1A2A10		10-12 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3720	5-11
1A1A2A11		12-14 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3721	5-11
1A1A2A12		14-16 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3722	5-11
1A1A2A13		16-18 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3723	5-11

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A2A14		18-20 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3724	5-11
1A1A2A15		20-22 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3725	5-11
1A1A2A16		22-24 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3726	5-11
1A1A2A17		24-26 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3727	5-11
1A1A2A18		26-28 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3728	5-11
1A1A2A19		28-30 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3729	5-11
1A1A2C1		CAPACITOR, FIXED CERAMIC: 25 PF ± 10%, 7500 VDCW, MFR 71590, PN 850S25Z	5-11
1A1A2C2		NOT USED	
1A1A2C3		CAPACITOR, FIXED CERAMIC: 50 PF ± 10%, 7500 VDCW, MFR 71590, PN 850S50Z	5-11
1A1A2C4		CAPACITOR, FIXED CERAMIC: 100 PF ± 10%, 5000 VDCW, MFR 71590, PN 850S100N	5-11
1A1A2C5		SAME AS 1A1A2C4	5-11
1A1A2C6		SAME AS 1A1A2C1	5-11
1A1A2C7 through 1A1A2C9		SAME AS 1A1A2C3	5-11
1A1A2C10		SAME AS 1A1A2C1	5-11
1A1A2C11 through 1A1A2C17		SAME AS 1A1A2C3	5-11
1A1A2C18 through 1A1A2C20		SAME AS 1A1A2C4	5-11
1A1A2C25		CAPACITOR, FIXED PORCELAIN: 750 PF ± 5 %, 500 VDCW, MFR 95275 PN VY83C751J	5-11

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A2C26		CAPACITOR, FIXED PORCELAIN: 680 PF ± 5%, 500 VDCW, MFR 95275, PN VY83C681J	5-11
1A1A2C27		CAPACITOR, FIXED PORCELAIN: 910 PF ± 5%, 500 VDCW, MFR 95275, PN VY83C911J	5-11
1A1A2C28		CAPACITOR, FIXED PORCELAIN: 1000 PF ± 5%, 500 VDCW, MFR 95275, PN VY83C102J	5-11
1A1A2C29		CAPACITOR, FIXED PORCELAIN: 360 PF ± 5%, 500 VDCW, 95275, PN VY82C361J	5-11
1A1A2C30		CAPACITOR, FIXED PORCELAIN: 430 PF ± 5%, 500 VDCW, MFR 95275, PN VY83C431J	5-11
1A1A2C31		CAPACITOR, FIXED PORCELAIN: 300 PF ± 5%, 500 VDCW, MFR 95275, PN VY82C301J	5-11
1A1A2C32		CAPACITOR, FIXED PORCELAIN: 270 PF ± 5%, 500 VDCW, MFR 95275, PN VY82C271J	5-11
1A1A2C33		SAME AS 1A1A2C31	5-11
1A1A2C34		SAME AS 1A1A2C32	5-11
1A1A2C35		CAPACITOR, FIXED PORCELAIN: 180 PF ± 5%, 500 VDCW, MFR 95275, PN VY82C181J	5-11
1A1A2C36		SAME AS 1A1A2C35	5-11
1A1A2C37		CAPACITOR, FIXED PORCELAIN: 150 PF ± 5%, 500 VDCW, MFR 95275, PN VY82C151J	5-11
1A1A2C38		CAPACITOR, FIXED PORCELAIN: 100 PF ± 5%, 500 VDCW, MFR 95275, PN VY81C101J	5-11
1A1A2C39 through 1A1A2C41		SAME AS 1A1A2C38	5-11
1A1A2C42		SAME AS 1A1A2C35	5-11
1A1A2C43		SAME AS 1A1A2C35	5-11
1A1A2C44		SAME AS 1A1A2C37	5-11
1A1A2C45		CAPACITOR, FIXED PORCELAIN: 110 PF ± 5%, 500 VDCW, MFR 95275, PN VY81C111J	5-11

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A2C46 through 1A1A2C48		SAME AS 1A1A2C45	5-11
1A1A2C49 through 1A1A2C52		SAME AS 1A1A2C38	5-11
1A1A2C53		CAPACITOR, FIXED PORCELAIN: 75 PF ± 5% 500 VDCW, MFR 95275, PN VY81C750J	5-11
1A1A2C54 through 1A1A2C56		SAME AS 1A1A2C53	5-11
1A1A2C57		CAPACITOR, FIXED PORCELAIN: 300 PF ± 5%, 2500 VDCW, MFR 14304, PN C11-0004-018	5-11
1A1A2C58		SAME AS 1A1A2C57	5-11
1A1A2C59		CAPACITOR, FIXED PORCELAIN: 56 PF ± 5%, 500 VDCW, MFR 95275, PN VY81C560J	5-11
1A1A2C60 through 1A1A2C62		SAME AS 1A1A2C59	5-11
1A1A2C63		CAPACITOR, FIXED PORCELAIN: 51 PF ± 5%, 500 VDCW, MFR 95275, PN VY81C510J	5-11
1A1A2C64 through 1A1A2C66		SAME AS 1A1A2C63	5-11
1A1A2C67		CAPACITOR, FIXED PORCELAIN: 240 PF ± 5%, 2500 VDCW, MFR 14304, PN C11-0004-024	5-11
1A1A2C68		CAPACITOR, FIXED PORCELAIN: 220 PF ± 5%, 2500 VDCW, MFR 14304, PN C11-0004-009	5-11
1A1A2P1		CONNECTOR, PLUG: MIL type UG-88E/U	5-11
1A1A2R1		RESISTOR, FIXED COMPOSITION: MIL type RC42GF273K	5-11
1A1A2R2 through 1A1A2R8		SAME AS 1A1A2R1	5-11

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A2S1		SWITCH ASSEMBLY, ROTARY: MFR 14304, PN 391-3732	5-11
1A1A3		VSWR BRIDGE ASSEMBLY: MFR 14304, PN 391-3420	5-12
1A1A3C1		CAPACITOR, FIXED MICA: MIL type CM05F361J03	5-12
1A1A3C2		CAPACITOR, FIXED ELECTROLYTIC: MIL type CS13BE225K	5-12
1A1A3C3		CAPACITOR, FIXED CERAMIC: MIL type CK60AW102M	5-12
1A1A3C4		SAME AS 1A1A3C3	5-12
1A1A3C5		SAME AS 1A1A3C2	5-12
1A1A3C6		CAPACITOR, VARIABLE GLASS: MIL type PC51H160	5-12
1A1A3CR1 through 1A1A3CR6		SAME AS 1A1CR13	5-12
1A1A3J1		SAME AS 1A1J1	5-12
1A1A3J2		CONNECTOR, COAXIAL: MIL type UG-625B/U	5-12
1A1A3L1		COIL, FIXED RF: MIL type LT4K071	5-12
1A1A3R1		RESISTOR, FIXED FILM: MIL type RL32S560G	5-12
1A1A3R2		SAME AS 1A1A3R1	5-12
1A1A3R3		RESISTOR, FIXED FILM: MIL type RL07S103J	5-12
1A1A3R4		RESISTOR, FIXED FILM: MIL type RL07S473J	5-12
1A1A3R5		RESISTOR, FIXED COMPOSITION: MIL type RC07GF272J	5-12
1A1A3R6		RESISTOR, FIXED COMPOSITION: MIL type RC07GF682J	5-12
1A1A3R7		RESISTOR, FIXED COMPOSITION: MIL type RC07GF393J	5-12
1A1A3R8		RESISTOR, FIXED COMPOSITION: MIL type RC07GF124J	5-12
1A1A3R9		RESISTOR, FIXED COMPOSITION: MIL type RC20GF105J	5-12
1A1A3T1		TRANSFORMER, TOROID: MFR 14304, PN 391-3426	5-12

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A4		DRIVER TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3800	5-13
1A1A4C1		SAME AS 1A1C5	5-13
1A1A4C2		SAME AS 1A1C5	5-13
1A1A4R1		RESISTOR, FIXED COMPOSITION: MIL type RC42GF102K	5-13
1A1A4S1		SWITCH ASSEMBLY: MFR 14304, PN 391-3833	5-13
1A1A4TB1		TERMINAL BOARD: 6 TERMINAL, MFR 75382, PN 411-1904-6	5-13
1A1A4TP1		JACK, TEST: MIL type MS16108-2A	5-13
1A1A4A1		2-2.5 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3807	5-13
1A1A4A2		2.5-3.0 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3808	5-13
1A1A4A3		3.0-4.0 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3809	5-13
1A1A4A4		4.0-6.0 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3810	5-13
1A1A4A5		6.0-8.0 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3811	5-13
1A1A4A6		8.0-10 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3812	5-13
1A1A4A6C1		CAPACITOR, FIXED CERAMIC: MIL type CC25CH390G	5-13
1A1A4A6L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3812-1	5-13
1A1A4A6R1		SAME AS 1A1R5	5-13
1A1A4A7		10-12 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3813	5-13
1A1A4A7C1		CAPACITOR, FIXED CERAMIC: MIL type CC25CH330G	5-13
1A1A4A7L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3813-1	5-13
1A1A4A7R1		SAME AS 1A1R5	5-13

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A4A8		12-14 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3814	5-13
1A1A4A8C1		CAPACITOR, FIXED CERAMIC: MIL type CC25CH300G	5-13
1A1A4A8L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3814-1	5-13
1A1A4A8R1		SAME AS 1A1R5	5-13
1A1A4A9		14-16 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3815	5-13
1A1A4A9C1		CAPACITOR, FIXED CERAMIC: MIL type CC25CH270G	5-13
1A1A4A9L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3815-1	5-13
1A1A4A9R1		SAME AS 1A1R5	5-13
1A1A4A10		16-18 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3816	5-13
1A1A4A10C1		SAME AS 1A1A4A9C1	5-13
1A1A4A10L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3816-1	5-13
1A1A4A10R1		RESISTOR, FIXED COMPOSITION: MIL type RC42GF272K	5-13
1A1A4A11		18-20 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3817	5-13
1A1A4A11C1		SAME AS 1A1A4A9C1	5-13
1A1A4A11L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3817-1	5-13
1A1A4A11R1		SAME AS 1A1A4A10R1	5-13
1A1A4A12		20-22 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3818	5-13
1A1A4A12C1		CAPACITOR, FIXED CERAMIC: MIL type CC20CH240G	5-13
1A1A4A12L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3818-1	5-13
1A1A4A12R1		SAME AS 1A1A4A10R1	5-13
1A1A4A13		22-24 TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3819	5-13

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A4A13C1		SAME AS 1A1A4A12C1	5-13
1A1A4A13L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3819-1	5-13
1A1A4A13R1		RESISTOR, FIXED COMPOSITION: MIL type RC42GF472K	5-13
1A1A4A14		24-26 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3820	5-13
1A1A4A14C1		SAME AS 1A1A4A9C1	5-13
1A1A4A14L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3820-1	5-13
1A1A4A14R1		RESISTOR, FIXED COMPOSITION: MIL type RC42GF822K	5-13
1A1A4A15		26-28 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3821	5-13
1A1A4A15C1		SAME AS 1A1A4A9C1	5-13
1A1A4A15L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3821-1	5-13
1A1A4A16		28-30 MC TRANSFORMER ASSEMBLY: MFR 14304, PN 391-3822	5-13
1A1A4A16C1		SAME AS 1A1A4A12C1	5-13
1A1A4A16L1/L2		COIL ASSEMBLY: MFR 14304, PN 391-3822-1	5-13
1A1A5		POWER CONTROL PCB ASSEMBLY, MFR 14304, PN 391-3360	5-14
1A1A5C1		CAPACITOR, FIXED ELECTROLYTIC: MIL type CS13BE476K	5-14
1A1A5C2		CAPACITOR, FIXED ELECTROLYTIC: MIL type CS13BE336K	5-14
1A1A5C3		CAPACITOR, FIXED CERAMIC: MIL type CK62AW822M	5-14
1A1A5C4		SAME AS 1A1A3C3	5-14
1A1A5C5		SAME AS 1A1A3C3	5-14
1A1A5C6		CAPACITOR, FIXED ELECTROLYTIC: MIL type CS13BF105K	5-14
1A1A5CR1		SAME AS 1A1CR1	5-14

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A5CR2		DIODE: MIL type 1N277M	5-14
1A1A5CR3 through 1A1A5CR6		SAME AS 1A1A5CR2	5-14
1A1A5CR7		SAME AS 1A1CR1	5-14
1A1A5CR8		SAME AS 1A1A5CR2	5-14
1A1A5CR9		SAME AS 1A1CR13	5-14
1A1A5CR10 through 1A1A5CR16		SAME AS 1A1A5CR2	5-14
1A1A5CR17		SAME AS 1A1CR1	5-14
1A1A5CR18		NOT USED	5-14
1A1A5CR19		SAME AS 1A1CR7	5-14
1A1A5CR20		SAME AS 1A1CR7	5-14
1A1A5CR21 through 1A1A5CR29		SAME AS 1A1CR1	5-14
1A1A5CR30		SAME AS 1A1CR7	5-14
1A1A5CR31		SAME AS 1A1CR7	5-14
1A1A5CR32		SAME AS 1A1CR1	5-14
1A1A5MP1		POWER CONTROL PCB: MFR 14304, PN 391-3362	5-14
1A1A5Q1		NOT USED	
1A1A5Q2		TRANSISTOR: MIL type 2N1132	5-14
1A1A5Q3		TRANSISTOR: MIL type 2N1613	5-14
1A1A5Q4		TRANSISTOR: MIL type 2N404	5-14
1A1A5Q5		SAME AS 1A1A5Q4	5-14
1A1A5Q6		TRANSISTOR: MIL type 2N398A	5-14

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A5Q7 through 1A1A5Q11		SAME AS 1A1A5Q3	5-14
1A1A5Q12		SAME AS 1A1A5Q4	5-14
1A1A5R1		NOT USED	5-14
1A1A5R2		NOT USED	
1A1A5R3		RESISTOR, FIXED COMPOSITION: MIL type RC07GF472K	5-14
1A1A5R4		RESISTOR, FIXED COMPOSITION: MIL type RC07GF391K	5-14
1A1A5R5		RESISTOR, FIXED COMPOSITION: MIL type RC07GF182K	5-14
1A1A5R6		RESISTOR, FIXED COMPOSITION: MIL type RC07GF331K	5-14
1A1A5R7		RESISTOR, FIXED COMPOSITION: MIL type RC07GF221K	5-14
1A1A5R8		SAME AS 1A1A5R3	5-14
1A1A5R9		RESISTOR, FIXED COMPOSITION: MIL type RC07GF102K	5-14
1A1A5R10		SAME AS 1A1A5R3	5-14
1A1A5R11		SAME AS 1A1A5R3	5-14
1A1A5R12		RESISTOR, FIXED COMPOSITION: MIL type RC07GF122K	5-14
1A1A5R13		RESISTOR, FIXED COMPOSITION: MIL type RC07GF181K	5-14
1A1A5R14		SAME AS 1A1A5R4	5-14
1A1A5R15		SAME AS 1A1A5R7	5-14
1A1A5R16		RESISTOR, FIXED COMPOSITION: MIL type RC07GF821K	5-14
1A1A5R17		RESISTOR, FIXED COMPOSITION: MIL type RC07GF223K	5-14
1A1A5R19		RESISTOR, FIXED COMPOSITION: MIL type RC32GF471K	5-14
1A1A5R20		RESISTOR, FIXED COMPOSITION: MIL type RC07GF103K	5-14

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A5R21		SAME AS 1A1A5R20	5-14
1A1A5R22		SAME AS 1A1A4R1	5-14
1A1A5R25		RESISTOR, FIXED COMPOSITION: MIL type RC07GF681K	5-14
1A1A5R26		SAME AS 1A1A5R6	5-14
1A1A5R27		SAME AS 1A1A5R6	5-14
1A1A5R28		SAME AS 1A1A5R7	5-14
1A1A5R29		RESISTOR, FIXED COMPOSITION: MIL type RC07GF222K	5-14
1A1A5R30 through 1A1A5R33		SAME AS 1A1A5R29	5-14
1A1A5R34		RESISTOR, FIXED COMPOSITION: MIL type RC20GF101K	5-14
1A1A5R35		RESISTOR, FIXED COMPOSITION: MIL type RC20GF391K	5-14
1A1A5TP1		JACK, TEST: MFR 74970, PN 105-758	5-14
1A1A5TP2		JACK, TEST: MFR 74970, PN 105-752	5-14
1A1A5TP3		JACK, TEST: MFR 74970, PN 105-756	5-14
1A1A5TP4		JACK, TEST: MFR 74970, PN 105-757	5-14
1A1A5TP5		JACK, TEST: MFR 74970, PN 105-754	5-14
1A1A6		APC-PPC PCB ASSEMBLY: MFR 14304, PN 391-3340	5-15
1A1A6C1		CAPACITOR, FIXED ELECTROLYTIC: MIL type CS13BG156K	5-15
1A1A6C2		NOT USED	
1A1A6C3		CAPACITOR, FIXED ELECTROLYTIC: MIL type CS13BE106K	5-15
1A1A6C4		CAPACITOR, FIXED ELECTROLYTIC: MIL type CS13BC227K	5-15

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A6C5		SAME AS 1A1A3C3	5-15
1A1A6C6		CAPACITOR, FIXED ELECTROLYTIC: MIL type CS13BF335K	5-15
1A1A6CR1		SAME AS 1A1A5CR2	5-15
1A1A6CR2		SAME AS 1A1CR1	5-15
1A1A6CR3		DIODE: MIL type 1N3033B	5-15
1A1A6CR4		SAME AS 1A1A6CR3	5-15
1A1A6CR5		SAME AS 1A1A5CR2	5-15
1A1A6CR6		NOT USED	
1A1A6CR7		SAME AS 1A1A5CR2	5-15
1A1A6CR8		SAME AS 1A1A5CR2	5-15
1A1A6CR9		SAME AS 1A1CR13	5-15
1A1A6CR10		NOT USED	
1A1A6CR11 through 1A1A6CR13		SAME AS 1A1CR13	5-15
1A1A6CR14 through 1A1A6CR17		SAME AS 1A1CR1	5-15
1A1A6CR18		SAME AS 1A1CR13	5-15
1A1A6CR19		SAME AS 1A1A5CR2	5-15
1A1A6CR20		SAME AS 1A1CR13	5-15
1A1A6CR21 through 1A1A6CR26		SAME AS 1A1A5CR6	5-15
1A1A6Q1		SAME AS 1A1A5Q3	5-15
1A1A6Q2		SAME AS 1A1A5Q3	5-15
1A1A6Q3		SAME AS 1A1A5Q6	5-15

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A6Q4 through 1A1A6Q6		NOT USED	
1A1A6Q7		TRANSISTOR: MIL type 2N1309	5-15
1A1A6Q8		SAME AS 1A1A5Q3	5-15
1A1A6Q9		SAME AS 1A1A5Q2	5-15
1A1A6Q10 through 1A1A6Q12		SAME AS 1A1A5Q3	5-15
1A1A6Q13		SAME AS 1A1A5Q2	5-15
1A1A6Q14 through 1A1A6Q16		SAME AS 1A1A5Q3	5-15
1A1A6Q17		SAME AS 1A1A5Q6	5-15
1A1A6Q18		NOT USED	
1A1A6Q19		SAME AS 1A1A5Q6	5-15
1A1A6Q20		SAME AS 1A1A5Q6	5-15
1A1A6Q21		SAME AS 1A1A5Q3	5-15
1A1A6R1		SAME AS 1A1A5R5	5-15
1A1A6R2		RESISTOR, FIXED COMPOSITION: MIL type RC07GF473K	5-15
1A1A6R3		RESISTOR, FIXED COMPOSITION: MIL type RC07GF682K	5-15
1A1A6R4		SAME AS 1A1A5R17	5-15
1A1A6R5		NOT USED	
1A1A6R6		RESISTOR, FIXED COMPOSITION: MIL type RC07GF104K	5-15
1A1A6R7		SAME AS 1A1A5R3	5-15
1A1A6R8		RESISTOR, FIXED COMPOSITION: MIL type RC07GF273K	5-15
1A1A6R9		RESISTOR, FIXED COMPOSITION: MIL type RC07GF333K	5-15

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A6R10		SAME AS 1A1A5R3	5-15
1A1A6R11		SAME AS 1A1A5R5	5-15
1A1A6R12		RESISTOR, FIXED COMPOSITION: MIL type RC07GF822K	5-15
1A1A6R13		SAME AS 1A1A6R2	5-15
1A1A6R14		SAME AS 1A1A5R29	5-15
1A1A6R15		RESISTOR, FIXED COMPOSITION: MIL type RC07GF562K	5-15
1A1A6R16		SAME AS 1A1A5R12	5-15
1A1A6R17		SAME AS 1A1A5R20	5-15
1A1A6R18		SAME AS 1A1A5R13	5-15
1A1A6R19		RESISTOR, FIXED COMPOSITION: MIL type RC07GF123K	5-15
1A1A6R20		SAME AS 1A1A5R6	5-15
1A1A6R21		RESISTOR, FIXED COMPOSITION: MIL type RC07GF183K	5-15
1A1A6R22		RESISTOR, FIXED COMPOSITION: MIL type RC07GF124K	5-15
1A1A6R23		RESISTOR, FIXED COMPOSITION: MIL type RC07GF222K	5-15
1A1A6R24		SAME AS 1A1A5R20	5-15
1A1A6R25	6	RESISTOR, FIXED COMPOSITION: MIL type RC07GF K	5-15
1A1A6R26		RESISTOR, FIXED COMPOSITION: MIL type RC07GF272K	5-15
1A1A6R27		SAME AS 1A1A5R17	5-15
1A1A6R28		SAME AS 1A1A6R19	5-15
1A1A6R29		SAME AS 1A1A5R9	5-15
1A1A6R30		SAME AS 1A1A5R6	5-15
1A1A6R31		SAME AS 1A1A6R3	5-15
1A1A6R32		SAME AS 1A1A6R19	5-15
1A1A6R33		SAME AS 1A1A6R15	5-15

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A6R34		SAME AS 1A1A5R5	5-15
1A1A6R35		SAME AS 1A1A6R26	5-15
1A1A6R36		RESISTOR, FIXED COMPOSITION: MIL type RC20GF683K	5-15
1A1A6R37		NOT USED	5-15
1A1A6R38		RESISTOR, FIXED COMPOSITION: MIL type RC07GF122K	5-15
1A1A6R39		RESISTOR, FIXED COMPOSITION: MIL type RC07GF392K	5-15
1A1A6R40		SAME AS 1A1A5R17	5-15
1A1A6R41		RESISTOR, FIXED COMPOSITION: MIL type RC07GF563K	5-15
1A1A6R42		RESISTOR, FIXED COMPOSITION: MIL type RC42GF682K	5-15
1A1A6R43		SAME AS 1A1A5R29	5-15
1A1A6R44		SAME AS 1A1A5R29	5-15
1A1A6R45		SAME AS 1A1A6R6	5-15
1A1A6R46		SAME AS 1A1A6R26	5-15
1A1A6R47		SAME AS 1A1A5R20	5-15
1A1A6R48		SAME AS 1A1A6R9	5-15
1A1A6R49		SAME AS 1A1A5R20	5-15
1A1A6R50 through 1A1A6R53		NOT USED	
1A1A6R54		SAME AS 1A1A6R8	5-15
1A1A6TP1		SAME AS 1A1A5TP1	5-15
1A1A6TP2		SAME AS 1A1A5TP2	5-15
1A1A6TP3		SAME AS 1A1A5TP3	5-15
1A1A6TP4		SAME AS 1A1A5TP4	5-15
1A1A7		METER RESISTOR PCB ASSEMBLY: MFR 14304, PN 391-3400	5-16

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A7R1		RESISTOR, FIXED COMPOSITION: MIL type RC42GF393K	5-16
1A1A7R2		SAME AS 1A1A7R1	5-16
1A1A7R3		SAME AS 1A1A7R1	5-16
1A1A7R4 through 1A1A7R6		NOT USED	
1A1A7R7		RESISTOR, FIXED FILM: MIL type RL42S125G	5-16
1A1A7R8		SAME AS 1A1A7R7	5-16
1A1A7R9		SAME AS 1A1A1R7	5-16
1A1A7R10 through 1A1A7R12		NOT USED	
1A1A7R13		SAME AS 1A1A7R7	5-16
1A1A7R14		SAME AS 1A1A7R7	5-16
1A1A7R15		SAME AS 1A1A1R7	5-16
1A1A7R16		RESISTOR, FIXED FILM: MIL type RL32S474G	5-16
1A1A7R17		RESISTOR, FIXED FILM: MIL type RL32S514G	5-16
1A1A7R18 through 1A1A7R20		SAME AS 1A1A7R17	5-16
1A1A7R21		SAME AS 1A1A1R7	5-16
1A2		CASE ASSEMBLY: MFR 14304, PN 391-2000	5-17
1A2C1		SAME AS 1A1C5	5-17
1A2C2		SAME AS 1A1C5	5-17
1A2FL1/J5		FILTER, INPUT LINE: MFR 14304, PN 391-2300	5-17
1A2J1		CONNECTOR, RECEPTACLE: MIL type MS3102R28-17S	5-17

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2J2		NOT USED	
1A2J3		CONNECTOR, COAXIAL: MIL type UG-556B/U	5-17
1A2J4		SAME AS 1A2J3	5-17
1A2J6 through 1A2J8		NOT USED	
1A2J9		SAME AS 1A1J1	5-17
1A2K1		RELAY, COAXIAL: 28 VDC, SPDT, MFR 00471, PN DK-137	5-17
1A2P1		SAME AS 1A1A2P1	5-17
1A2P2		NOT USED	
1A2P3		CONNECTOR, PLUG: MFR 14304, PN 391-2405	5-17
1A2P4 through 1A2P7		SAME AS 1A1A2P1	5-17
1A2S1		SAME AS 1A1S9	5-17
1A2S2		SAME AS 1A1S9	5-17
1A2A1		FILTER BOX ASSEMBLY: MFR 14304, PN 391-2100	5-17
1A2A1C1		CAPACITOR, FIXED CERAMIC: MIL type CK70AW152M	5-17
1A2A1C2 through 1A2A1C21		SAME AS 1A2A1C1	5-17
1A2A1C22		SAME AS 1A1C5	5-17
1A2A1CR1		SAME AS 1A1CR1	5-17
1A2A1CR2		SAME AS 1A1CR1	5-17
1A2A1J1		NOT USED	
1A2A1J2		CONNECTOR, RECEPTACLE: MIL type MS3102R28-12S	5-17

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A2A1J3 through 1A2A1J5		NOT USED	
1A2A1J6		CONNECTOR, RECEPTACLE: MIL type MS3102R20-27S	5-17
1A2A1J7		CONNECTOR, RECEPTACLE: MIL type MS3102R28-21S	5-17
1A2A1J8		CONNECTOR, RECEPTACLE: MIL type MS3102R18-1S	5-17
POWER SUPPLY PP-3917/UR			
1A1A8		POWER SUPPLY PP-3917/UR: MFR 14304, PN 391-9000	5-18
1A1A8C1		CAPACITOR, FIXED PAPER: MIL type CP70B1EF106K1	5-18
1A1A8CR1		DIODE STACK: RECTIFIER, SILICON, 3Ø BRIDGE, 2400 PIV, 50A, MFR 14304, PN D22-5002-000	5-18
1A1A8CR2		SAME AS 1A1A8CR1	5-18
1A1A8CR3		DIODE STACK: RECTIFIER, SILICON, 3Ø BRIDGE, 1000 V PIV, 50 A, MFR 14304, PN D22-5001-000	5-18
1A1A8P1		FANNING STRIP: MFR 14304, PN 391-9038	5-18
1A1A8P2		FANNING STRIP: MFR 14304, PN 391-9039	5-18
1A1A8T1		TRANSFORMER, POWER: MFR 14304, PN 391-9015	5-18
1A1A8T2		TRANSFORMER, POWER: MFR 14304, PN 391-9014	5-18
1A1A8A1		INVERTER ASSEMBLY: MFR 14304, PN 391-9100	5-19
1A1A8A1C1		CAPACITOR, FIXED ELECTROLYTIC: MIL type CL25BJ151TP3	5-19
1A1A8A1C2		CAPACITOR, FIXED PAPER: MIL type CP05A1KC223K3	5-19
1A1A8A1C3		SAME AS 1A1A8A1C2	5-19
1A1A8A1CR1		SAME AS 1A1CR1	5-19
1A1A8A1CR2		SAME AS 1A1CR1	5-19
1A1A8A1CR3		SAME AS 1A1CR1	5-19

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
1A1A8A1Q1		TRANSISTOR: TYPE 2N2290B, MFR 04713, PN 2N2290	5-19
1A1A8A1Q2		SAME AS 1A1A8A1Q1	5-19
1A1A8A1R1		RESISTOR, FIXED COMPOSITION: MIL type RC20GF100K	5-19
1A1A8A1R2		RESISTOR, FIXED COMPOSITION: MIL type RC32GF222K	5-19
1A1A8A1R3		SAME AS 1A1A8A1R1	5-19
1A1A8A1R4		SAME AS 1A1A8A1R2	5-19
1A1A8A1T1		TRANSFORMER, TOROID: MFR 14304, PN 391-9104	5-19
1A1A8A2		BLEEDER RESISTOR ASSEMBLY: MFR 14304, PN 391-9200	5-18
1A1A8A2R1		RESISTOR, FIXED COMPOSITION: MIL type RC42GF224K	5-18
1A1A8A2R2 through 1A1A8A2R5		SAME AS 1A1A8A2R1	5-18
1A1A8A2R6		RESISTOR, FIXED COMPOSITION: MIL type RC42GF683K	5-18
1A1A8A2R7		SAME AS 1A1A8A2R6	5-18

POWER SUPPLY PP-3916/UR

2		POWER SUPPLY PP-3916/UR: MFR 14304, PN 391-6000	5-20
2A1		CHASSIS PANEL ASSEMBLY: MFR 14304, PN 391-8100	5-20
2A1C1		CAPACITOR, FIXED PAPER: 25 UF ± 10%, 600 VDCW, MFR 53021, PN 702012-5602	5-20
2A1C2		CAPACITOR, FIXED ELECTROLYTIC: MIL type CE71C142G	5-20
2A1C3		SAME AS 2A1C2	5-20
2A1CR1		SAME AS 1A1A8CR3	5-20
2A1CR2		SAME AS 1A1A8CR1	5-20

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
2A1CR3		SAME AS 1A1A8CR1	5-20
2A1CR4		DIODE: MFR 04713, PN 1N4721	5-20
2A1CR5 through 2A1CR7		SAME AS 2A1CR4	5-20
2A1CR8 through 2A1CR11		SAME AS 1A1CR1	5-20
2A1DS1		SAME AS 1A1DS2	5-20
2A1F1		FUSE, CARTRIDGE: MIL type F02B-5A	5-20
2A1F2		FUSE, CARTRIDGE: MIL type F02A1-5A	5-20
2A1Q1		TRANSISTOR: MIL type 2N1412	5-20
2A1Q2		SAME AS 2A1Q1	5-20
2A1R1		RESISTOR, FIXED COMPOSITION: MIL type RC42GF100K	5-20
2A1R2		SAME AS 2A1R1	5-20
2A1R3		RESISTOR, FIXED COMPOSITION: MIL type RC20GF682K	5-20
2A1R4		SAME AS 2A1R3	5-20
2A1R5		SAME AS 2A1R1	5-20
2A1R6		SAME AS 2A1R1	5-20
2A1S1		SWITCH, THERMAL: SPST, OPEN AT 185°, MFR 14304, PN S70-0002-000	5-20
2A1S2 through 2A1S4		SAME AS 1A1S9	5-20
2A1T1		TRANSFORMER, TOROID: MFR 14304, PN 391-8405	5-20
2A1TB1		TERMINAL BOARD: MIL type 37TB24	5-20
2A1XDS1		SAME AS 1A1XDS2	5-20
2A1XF1		SAME AS 1A1XF6	5-20

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
2A1XF2		SAME AS 1A1XF4	5-20
2A1A1		BLEEDER RESISTOR ASSEMBLY: MFR 14304, PN 391-8111	5-20
2A1A1R1		SAME AS 1A1A8A2R6	5-20
2A1A1R2		SAME AS 1A1A8A2R6	5-20
2A1A1R3 through 2A1A1R7		SAME AS 1A1A8A2R1	5-20
2A2		CASE ASSEMBLY: MFR 14304, PN 391-8700	5-20
2A2J1		CONNECTOR, RECEPTACLE: MIL type MS3102R28-17P	5-20
2A2P1	5	PLUG, 208 V JUMPER: MFR 14304, PN 391-8200	5-20
2A2P2		PLUG, 440 V JUMPER: MFR 14304, PN 391-8300	5-20
2A2T1/T2		CASE AND TRANSFORMER ASSEMBLY: MFR 14304, PN 391-7200	5-20
2A2TB1		SAME AS 2A1TB1	5-20

RADIO TRANSMITTER T-827/URT

3	3	RADIO TRANSMITTER T-827/URT: G.F.E.	3-1

BASE, SHOCK MOUNT, ELECTRICAL EQUIPMENT, MT-3399/U

4	4	BASE, SHOCK MOUNT, ELECTRICAL EQUIPMENT MT-3399/U: MFR 14304, PN 391-0900	1-1

ANCILLARY ITEMS

		CABLE ASSEMBLY W1: MFR 14304, PN 399-0025	
		CABLE ASSEMBLY W2: MFR 14304, PN 399-0026	
		CABLE ASSEMBLY W3: MFR 14304, PN 399-0027	
		CONN, PLUG, ELEC: MFR 12143, PN 10-109620-19S	

TABLE 6-2. MAINTENANCE PARTS LIST (Cont)

REF DESIG	NOTES	NAME AND DESCRIPTION	FIG. NO.
		CONN, PLUG, ELEC: MFR 12143, PN 10-109618-1P CONN, PLUG, ELEC: MFR 12143, PN 10-19628-12P CONN, COAX, ELEC: MIL type UG-982/U CONN, COAX, ELEC: MIL type UG-941B/U	

TABLE 6-3. LIST OF MANUFACTURERS

MFR CODE	NAME	ADDRESS
00471	Dow Key Co., Inc.	Warren, Minn.
02660	Amphenol-Borg Electronics Corp.	Broadview-Chicago, Ill.
04713	Motorola Inc. Semiconductor Products Div.	Phoenix, Ariz.
08594	Eital McCullogh, Inc.	Salt Lake City, Utah
12143	Bendix Corp., Scintilla Division	Santa Ana, California
14304	RF Communications, Inc.	Rochester, New York
18787	Electropac, Inc.	Peterborough, N.H.
53021	Sangamo Electric Company	Springfield, Illinois
71590	Centralab Div. of Globe-Union, Inc.	Milwaukee, Wisc.
74970	E. F. Johnson, Inc.	Waseca, Minn.
75382	Kulka Mfg. Company	Mt. Vernon, New York
77342	Potter & Brumfield Div. of American Machine & Foundry Co.	Princeton, Ind.
79089	Radio Corporation of America RCA Victor Television Division	Camden, N.J.
89606	Voland Corporation	New Rochelle, New York

TABLE 6-3. LIST OF MANUFACTURERS (Cont)

MFR CODE	NAME	ADDRESS
95275	Vitramon, Inc.	Bridgeport, Conn.
97896	United Control Corporation	Seattle, Washington
98291	Sealectro Corporation	New Rochelle, New York

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